2 Magazines in 1

RADIO & TELEVISION

Incorporating

FOTO-CRAFT

RADIO PORTRAITURE
See Page 627

HEAR "WAR NEWS" DIRECT WITH - OVERSEAS 2-TUBER
See Page 584

25¢ IN U.S AND CANADA

HUGO GERNSBACK
EDITOR

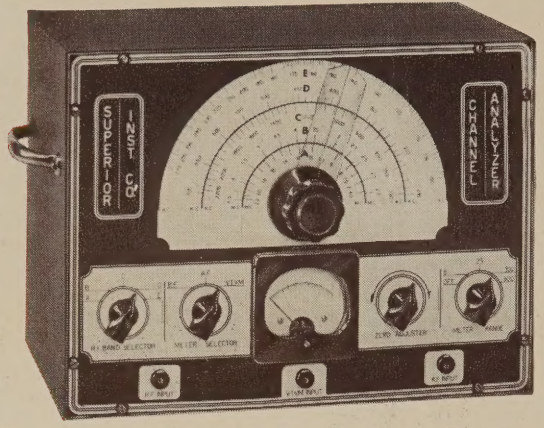
AMATEUR & EXPERIMENTAL RADIO

CONSTRUCTIVE PHOTO ARTICLES

FEB. 1940

THE NEW CHANNEL-ANALYZER

Follows The SIGNAL from Antenna to Speaker



The well-established and authentic SIGNAL TRACING METHOD of locating the very circuit in which there is trouble, and the very component that causes the trouble, is now for the first time available at a price any radio serviceman can afford.

The CHANNEL-ANALYZER will

- ★ Follow signal from antenna to speaker through all stages of any receiver ever made.
- ★ Instantly track down exact cause of intermittent operation.
- ★ Measure both Automatic-Volume-Control and Automatic-Frequency-Control, voltages and circuits without appreciably loading the circuit, using built-in highly sensitive Vacuum-Tube Voltmeter.
  Check exact gain of every individual stage in receiver.
  Track down and locate cause of distortion in R.F., I.F., and A.F. amplifier.
- ★ Check exact operating voltage of each tube.
- ★ Locate leaky condensers and all high-resistance shorts, also show opens.
- ★ Measure exact frequencies, amount of drift and comparative output of oscillators in superhets.
- ★ Track down exact cause of noise.

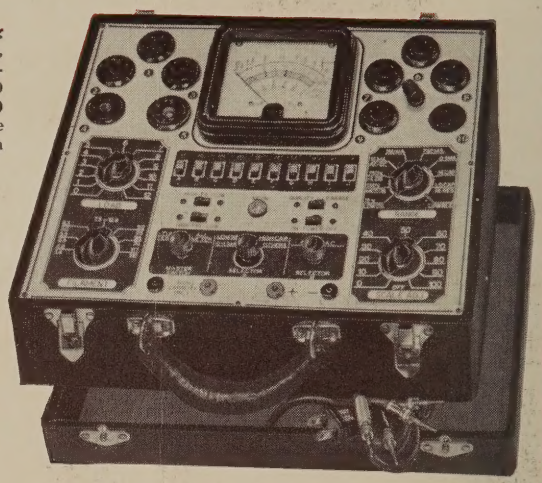
The Superior Channel-Analyzer comes housed in shielded cabinet and features an attractive etched aluminum panel. Supplied complete with tubes, three specially engineered shielded input cables, each identified as to its purpose. Also full operating instructions. Size 13" x 10" x 6". Shipping weight 19 pounds. Only $19.75

THE NEW MODEL 1280 SET-TESTER

Combines Models 1240 and 1250

A complete testing laboratory in one unit, the Model 1280 combines the Models 1250 Multitester and 1240 Tube Tester. (See specifications of each below.)

- ★ Instantaneous Snap Switches Reduce Actual Testing Time to Absolute Minimum.
- ★ Spare Socket and Filament Voltages Up to 120 Volts, Make the Model 1280 Obsolescence Proof.
- ★ Latest Design 4½ D'Arsonval Type Meter.
- ★ Works on 90 to 125 Volts 60 Cycles A.C.



Even those servicemen who through past purchases know they can always get SUPER-VALUES from Superior, will be amazed and delighted when they read the specifications of this all-purpose instrument and then note the unbelievably low price. The Model 1280 features a 4½" D'Arsonval type meter for easy reading of the various scales, and in line with our new policy of stressing appearance as well as serviceability in our new 1200 line of test equipment, our Model 1280 utilizes an aluminum etched panel, designed for beauty as well as ruggedness. The primary function of an instrument is, of course, to make measurements accurately and when designing test equipment this is our first thought. However, we also appreciate the important part the appearance of an instrument plays in the impression a serviceman makes on his customers, especially on home calls. We have, therefore, paid special attention to the outward design of all of our new instruments. For instance, the panel of this Model 1280 is made of heavy-gauge aluminum and etched by a radically new process which results in a beautiful, confidence inspiring appearance.

Model 1280 comes complete with test leads, tabular data and instructions. Shipping weight 18 pounds. Size 13" x 11" x 6½". Our net price .. **$19.95**

Portable cover $1.00 additional

THE NEW MODEL 1250 MULTITESTER

SLOPING PANEL FOR PRECISE RAPID SERVICING

Etched aluminum panel

Specially designed electronic rectifier enables linear A.C. scale, high stability and little or no temperature drift.

Here is an opportunity to acquire a Multi-Service, Precision Engineered Instrument, for less than you would have to pay for an ordinary Volt-Ohm Milliammeter. Besides making the usual volt, resistance and current measurements (both A.C. and D.C.) this unit accurately measures the CAPACITIES of mica, paper and electrolytic condensers, INDUCTANCE of coils, chokes and transformers, DECIBEL gain or loss, of power amplifiers and public address systems, WATTS output of amplifiers, receivers, etc.

SPECIFICATIONS

Complete A.C. and D.C. Voltage and Current Ranges	High and Low Capacity Scales .0005 to 1 mfd. and .05 to 50 mfd.
D.C. Voltage:—0-15, 0-150, 0-750 volts	3 Decibel Ranges
A.C. Voltage:—0-15, 0-150, 0-750 volts	−10 to +19, −10 to +38, −10 to +53
D.C. Current:—0-1, 0-15, 0-150, 0-750 ma.	
A.C. Current:—0-15, 0-150, 0-750 ma.	Inductance: 1 to 700 Henries
2 Resistance Ranges 0-500 ohms, 500-5 megohms	Watts: Based on 6 mw. at 0 D.B. in 500 ohms .006000 to 600 Watts

Model 1250 works on 90-120 volts 60 cycles A.C. Comes complete with test leads, tabular charts and instructions. Shipping weight 9 lbs. Size 9½" x 11" x 6½". Our net price **$11.85**

Portable cover $1.00 additional

THE NEW MODEL 1240 TUBE TESTER

Instantaneous snap switches reduce actual testing time to absolute minimum.

●

Tests all tubes 1.4 to 117 volts.

●

Sockets for all tubes— No adapters.

●

Superior is proud to offer the newest and most practical tube tester ever designed. Unbelievably low in price—unbelievably high in performance.

- ★ Tests all tubes, 1.4 to **117 volts**, including 4, 5, 6, 7, 7L, octals, loctals, Bantam Jr., Peanut, single ended, floating filament, Mercury Vapor Rectifiers, the new S series, in fact every tube designed to date.
- ★ Spare socket included on front panel for any future tubes.
- ★ Tests by the well-established emission method for tube quality, directly read on the GOOD ? BAD scale of the meter.
- ★ Jewel protected neon.
- ★ Tests shorts and leakages up to 2 megohms in all tubes.
- ★ Tests leakages and shorts in all elements **AGAINST** all elements in all tubes.
- ★ Tests **BOTH** plates in rectifiers.
- ★ Tests individual sections such as diodes, triodes, pentodes, etc., in multi-purpose tubes.
- ★ Latest type voltage regulator.
- ★ Features an attractive etched aluminum panel.
- ★ Works on 90 to 125 volts 60 cycles A.C.

Model 1240 comes complete with instructions and tabular data for every known type of receiving tube. Shipping weight 12 pounds. Size 6" x 7½" x 10¾". Our Net Price..... **$11.85**

Portable cover $1.00 additional

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I WILL TRAIN YOU TO START

A SPARE TIME OR FULL TIME

RADIO SERVICE BUSINESS WITHOUT CAPITAL

J. E. Smith, Pres. National Radio Institute Est. 25 Years

I Trained These Men

These Men Have SPARE TIME BUSINESSES

"I repaired many Radio sets when I was on my tenth lesson. I really don't see how you can give so much for such a small amount of money. I made $600 in a year and a half, and I have made an average of $10 to $20 a week—just spare time."
JOHN JERRY
1529 Arapahoe St., Denver, Colo.

"I am now making from $10 to $25 a week in spare time while still holding my regular job as a machinist. I owe my success to N.R.I."
WM. F. RUPP
611 Green Street, Bridgeport, Pa.

"I repair Radios in spare time only and it certainly is a profitable business. In the last 12 months I've earned exactly $630. I started making money at the 25th lesson. I've had three jobs offered to me."
PETE BAUMERT
1646 Stewart Ave., Youngstown, O.

I Trained These Men

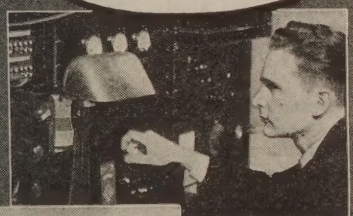
These Men Have FULL TIME BUSINESSES

"For the last two years I have been in business for myself making between $200 to $300 a month. Business has steadily increased. I have N.R.I. to thank for my start in this field."
ARLIE J. FROEHNER
300 W. Texas Ave., Goose Creek, Texas

"Before taking your Course I earned about 17½ cents per hour as a truck driver. When I had completed 20 lessons I started service work. During the last year I have made about $3,000 in Radio. I now own my own shop."
KARL KELLY
306 W. Calhoun St., Magnolia, Ark.

"I am making between $50 and $60 a week after all expenses are paid, and I am getting all the Radio work I can take care of, thanks to N.R.I."
H. W. SPANGLER
126½ S. Gay St., Knoxville, Tenn.

N.R.I. MEN WORK IN THESE BRANCHES, TOO



(Above) Broadcasting Stations employ operators, installation, maintenance men and Radio Technicians in other capacities and pay well.

(Above) Radio Jobbers and Dealers employ installation and servicemen at good pay.

(Above) Loud Speaker System is another field for Radio Technicians. (Left) Police, Aviation and Commercial Radio are newer fields for which we give the required knowledge of Radio.

The world-wide use of Radio has made many opportunities for you to have a spare time or full time Radio service business of your own. Four out of every five homes in the United States have Radio sets which regularly need repairs, new tubes, etc. Servicemen can earn good commissions too, selling new sets to owners of old models. Even if you have no knowledge of Radio or electricity, I will train you at home in your spare time to sell, install, fix, all types of Radio sets; to start your own Radio business and build it up on money you make in your spare time while learning. You don't need to give up your present job or spend a lot of money going away to school to become a Radio Technician. Mail coupon for my 64-page book. It's Free—it shows what I have done for others—what I am ready to do for you.

MANY MAKE $5 TO $10 A WEEK EXTRA IN SPARE TIME WHILE LEARNING

The day you enroll I start sending Extra Money Job Sheets which start showing you how to do Radio repair jobs. Throughout your Course I send plans and directions that made good spare time money—$200 to $500—for hundreds, while learning. I send you special Radio equipment to conduct experiments and build circuits. This 50-50 method of training—with printed texts and conducting experiments—makes learning at home interesting, fascinating, practical.

WHY MANY RADIO TECHNICIANS MAKE $30, $40, $50 A WEEK

Radio is already one of the country's large industries even though it is still young and growing. The arrival of Television, the use of Radio principles in industry, are but a few of many recent Radio developments. More than 28,000,000 homes have one or more Radios. There are more Radios than telephones. Every year millions of Radios get out of date and are replaced. Millions more need new tubes, repairs, etc. Over 5,000,000 auto Radios are in use and thousands more are being sold every day. In every branch, Radio is offering opportunities—opportunities for which I give you the required knowledge of Radio at home in your spare time. Yes, the few hundred $30, $40, $50 a week jobs of 20 years ago have grown to thousands.

JOBS LIKE THESE GO TO MEN WHO KNOW RADIO

Radio broadcasting stations employ engineers, operators, Radio Technicians and pay well. Radio manufacturers employ testers, inspectors, foremen, servicemen in good-pay jobs with opportunities for advancement. Radio jobbers and dealers employ installation and servicemen. Many Radio Technicians open their own Radio sales and repair businesses and make $30, $40, $50 a week. Others hold their regular jobs and make $5 to $10 a week fixing Radios in spare time. Automobile, police, aviation, commercial Radio; loudspeaker systems, electronic devices, are newer fields offering good opportunities to qualified men. Television promises to open many good jobs soon.

YOU ARE TRAINED FOR TELEVISION

With N.R.I. you learn Television principles right along with Radio principles—the correct method—since Television receivers combine both sight and sound. You also get more than ten text books devoted entirely to Television.

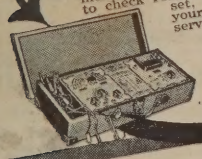
FIND OUT WHAT RADIO OFFERS YOU MAIL THE COUPON BELOW

Act Today. Mail the coupon now for Sample Lesson and 64-page book. They're free. They point out Radio's spare time and full time opportunities and those coming in Television; tell about my course in Radio and Television; show you letters from men I trained, telling what they are doing and earning. Read my Money Back Agreement. Find out what Radio offers YOU! MAIL COUPON in an envelope, or paste on a postcard—NOW!

J. E. SMITH, President
National Radio Institute, Dept. OBB3
Washington, D. C.

I ALSO GIVE YOU THIS PROFESSIONAL SERVICING INSTRUMENT

Here is the type of instrument Radio Technicians use—an All-Wave Set Servicing Instrument. It contains everything necessary to measure A.C. and D.C. voltages and current; to check resistances; adjust and align any set, old or new. It satisfies your needs for professional servicing after you graduate—can help you make extra money fixing sets while learning.



SAMPLE LESSON FREE

I want to prove our Course gives practical, money-making information, that it is easy to understand—what you need to master Radio. My sample lesson text, "Radio Receiver Troubles—Their Cause and Remedy," covers a long list of Radio receiver troubles in A.C., D.C., battery, universal, auto, T.R.F., superheterodyne, all-wave, and other types of sets. And a cross reference system gives you the probable cause and a quick way to locate and remedy these set troubles. A special section is devoted to receiver check-up, alignment, balancing, neutralizing, testing.

You can get this lesson Free by mailing the coupon.

Mail Now

GOOD FOR BOTH 64 PAGE BOOK SAMPLE LESSON FREE

J. E. SMITH, President, National Radio Institute
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Without obligating me, send Sample Lesson and 64-page Book FREE. I am particularly interested in the branch of Radio checked.

- ☐ Radio Service Business of My Own
- ☐ Spare Time Radio Repair Work
- ☐ Service Technician for Retail Stores
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- ☐ Loud Speaker Systems, Installations and Service
- ☐ Auto Radio Installation and Service
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RADIO & TELEVISION

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February — 1940
Vol. X No. 10

HUGO GERNSBACK, Editor
H. WINFIELD SECOR, Manag. Editor
ROBERT EICHBERG, Television and Photo Editor

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Certified Circuits

When you see this seal on a set it is a guarantee that it has been tested and certified in our laboratories, as well as privately in different parts of the country. Only constructional—experimental sets are certified.

You need not hesitate to spend money on parts because the set and circuit are bona fide.

This is the only magazine that renders such a service.

Cover composition by H. Gernsback and Thomas D. Pentz. 2-Tube War News Short Wave Receiver —see page 584. Radio Portraiture—see page 627.

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OUR SATISFIED CUSTOMERS ARE BUILDING UP OUR BUSINESS

One Serviceman tells Another of the EXTRA VALUES we offer. Our new address is 123 Liberty Street, where we have *three times more space* to take care of our increased sales

QUALITY Test Instruments at Prices Every Serviceman Can Afford!

So simple in operation that it is a **timesaver,** which gives you a chance to earn **more money.** Sales of radio sets have greatly increased this fall, therefore more work is awaiting the servicemen who own up-to-date test equipment. Thousands of servicemen will be needed in all branches of the Government Service.

Buy these efficient instruments and **be prepared for good paying positions.**

APPROVED POCKET ALL PURPOSE A.C. AND D.C. TESTER MODEL 720

Those who have had some experience with testers in the past, due to insensitive meters, will probably recognize in the Approved All Purpose Pocket Testmeters (0-1 Ma and 1000 ohms per volt) which overcome most of the troubles associated with this type of equipment.

Extremely careful design and co-ordinated components are used in the construction of the above unit.

TECHNICAL SPECIFICATIONS

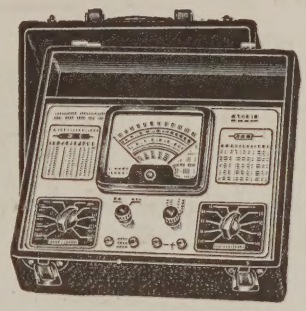
3" 1 Ma. D'Arsonval Jeweled movement, overall accuracy within 2% (1000 ohms per volt). D.C. Volts 0-2.5-10-50-250-500-2500. A.C. Volts 0-15-150-1500. Ohms 0-2500-25,000-250,000. D.C. Ma 0-1-10-100-1000 (1 ampere). Output ranges 0-15-150-1500. Decibels –10 to +19, –10 to +38, –10 to +53. Range on ohms reading can be extended to 2½ megohms. Zero adjustment for ohm ranges. Completely self-contained for all ranges. Beautifully frosted etched panel 14 gauge aluminum. Large, easy to read scales with knife edge pointer. Precision matched multipliers and shunts. Simplicity of operation. Housed in custom built leatherette cabinet. Every soldered connection is individually inspected.

Complete with battery and booklet of instructions. (Size 4" x 6⅞" x 2¼"). Shipping weight Model 720—2 lbs. **$7.85**

Model 710 D.C., same as above less A.C. volt ranges

Complete with battery and booklet of instructions. (Size 4" x 6⅞" x 2¼"). Shipping weight Model 710—2 lbs. **$5.85**

APPROVED STANDARD MODEL 730 A.C. AND D.C. ALLTESTMETER



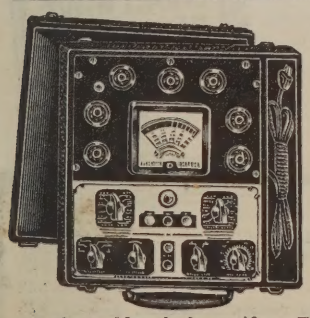
This portable analyzer is designed to cover all fundamental electrical measurements in a radio receiver or electrical appliances.

Besides—a R.M.A. Resistor and Condenser Color codes are etched right on a beautiful 14-gauge frosted aluminum two-tone panel. The entire instrument is very ruggedly constructed to withstand the hard usage apt to be received by portable instruments.

TECHNICAL SPECIFICATIONS

4½" Square D'Arsonval Jeweled Meter 0-1 Ma. sensitivity. (1000 ohms per volt.) D.C. Volts 0-15-150-750. D.C. Ma 0-1-15-150-750. A.C. Volts 0-15-150-750. A.C. Ma 0-15-150-750. Capacity .0005-1 mfd. .05-200 mfd. Ohms 0-500. 500-5 Megohms. Decibels –10 to +19, –10 to +38, –10 to +53. Output ranges 0-15-150-750. Inductance 1-700 henries. Watts, based on 6 M.W. at 0 O.B. in 500 ohms, .006000 to 600 watts. Zero adjustment for ohm ranges. Large, easy-to-read scales with knife edge pointer. Completely self-contained for all ranges. Accuracy on D.C. 2%, all others 5%. Every soldered connection individually inspected. Housed in custom built portable leatherette cabinet. Measures hum in filter systems. 6H6 tube Rectifier (works on 90-130 Volts A.C., 50-60 cycles). Multiplier resistors are completely insulated and sealed against atmospheric conditions. Shunts are wire wound.

Complete with booklet of instructions. Portable cover 75c extra. (Size 9¾" x 10½" x 5½"). Shipping weight Model 730—9 lbs. **$13.95**



APPROVED COMBINATION TUBE TESTER AND SET ANALYZER MODEL 2000C

Here is Approved, latest, finest complete portable Combination Tube tester and Set Analyzer. In every respect this is truly a "DeLuxe" instrument in appearance, performance and dependability.

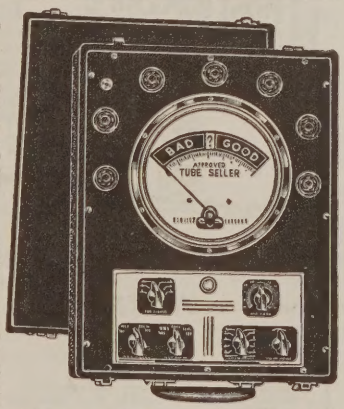
TECHNICAL SPECIFICATIONS

New! 9" Round D'Arsonval type meter 2% accuracy. Tests 35-45-50-70 up to 117 volt tubes including new OZ4, and other cold cathode rectifiers. Tests all metal, MG, spray shield and glass tubes. Tests new Loctal tubes as well as all single ended octal tubes. Tests all ballast tubes. Hot interelement short and leakage test between all individual elements. Hot cathode leakage test. High sensitivity neon indication. Individual test of each section of full wave rectifiers, duo diodes and all multi-purpose tubes. Line voltage indication directly on meter with smooth power control for variation of line voltage. Noise tests—Outlet for audible test of noisy tubes. For 105-135 Volts, 50-60 cycles power mains. All tests made according to R.M.A. standards. D.C. Volts 0-10-50-500-1000. A.C. Volts 0-10-50-500-1000. D.C. Ma 0-1-10-100-1000. D.C. Amp. 0-10. Ohms 0-500-5000-1 meg. 10 megohms. Decibels –8 + 15, –15 + 29, –29 + 49, –32 + 55. Output 0-10-50-500-1000. Condenser Leakage measurements. Qualitative Paper Condenser tests.

Model 2000C with 9" meter complete with test leads and booklet of instructions. (Size 17½" x 13½" x 5½"). Shipping weight Model 2000C—23 lbs. **$29.95**

Model 2000B, with 4½" meter complete with test leads and booklet of instructions. (Size 10⅞" x 14½" x 5½"). Shipping weight Model 2000B—19 lbs. **$23.95**

APPROVED "GIANT" MODEL 1300C TUBE SALESMAN



This new Approved tube Analyzer is designed for tube selling appeal, and high standards required for successful tube testing problems.

Characterized by the high perfection of Approved design and manufacture this new up-to-the-minute Analyzer tests the latest Loctal, single ended tubes, octal base metal and glass types. All tests made according to R.M.A. standards.

TECHNICAL SPECIFICATIONS

9" Round D'Arsonval type meter 2% accuracy. (G. E. Anilco magnet.) Tests 35-45-50-70 up to 117 volt tubes including new OZ4 and other cold cathode rectifiers. Tests all metal, MG., spray shield and glass tubes. Tests new Loctal tubes as well as all single ended, octal tubes. Tests all ballast tubes, pilot lights and miniature lamps. Hot interelement short and leakage test between all individual elements. Hot cathode leakage test. High sensitivity neon indication. Individual tests of each section of full wave rectifiers, duo diodes and all multi-purpose tubes. Line voltage indication directly on meter with smooth power control for variation of line voltage. Automatic switching cuts testing time in half. For 105-135 Volts, 56-60 cycle power mains. All tests made according to R.M.A. standards. Etched frosted aluminum panel with two tone black enamel background. Direct reading (Good-Bad) multi-colored and calibrated reference scale. Noise tests—Outlet for audible test of noisy tubes.

Model 1300C with 9" meter comes complete with booklet of instructions. (Size 13¾" x 17½" x 5½"). Portable cover $1.00 extra. Shipping weight Model 1300C—23 lbs. **$22.95**

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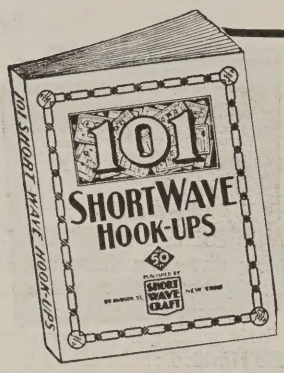

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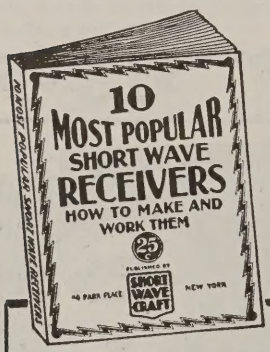

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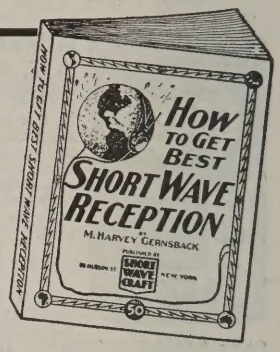

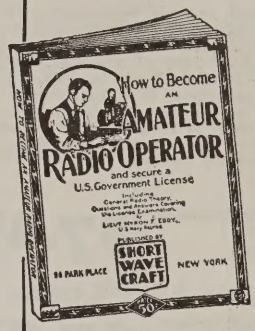

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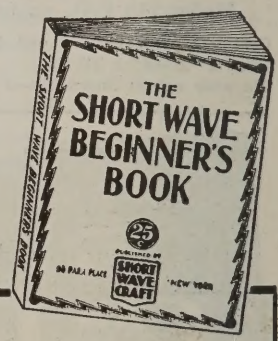

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HUGO GERNSBACK, EDITOR H. WINFIELD SECOR, MANAGING EDITOR

Vol. X February, 1940 No. 10

TELEVISION *Steps* AHEAD

Great activity in television and frequency modulation is predicted for 1940. Television networks are about to start and frequency modulation stations are growing over night like the proverbial mushroom.

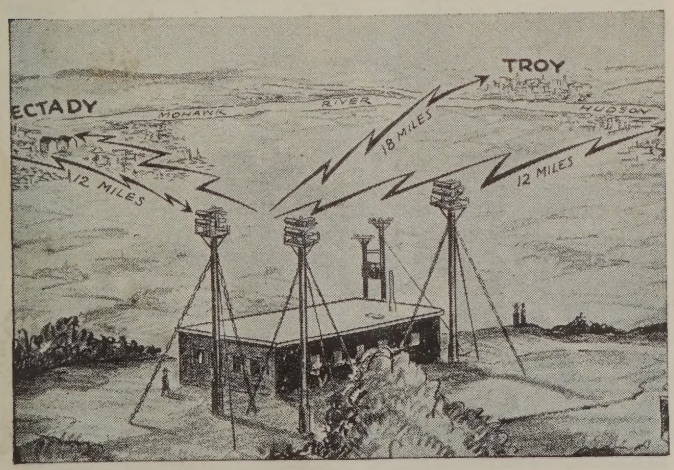
New RCA lightweight portable television pick-up field set was recently demonstrated before FCC members. Left to Right—James Lawrence Fly, chairman of the FCC, focusing camera; Commissioners Thad H. Brown, Norman S. Case and T. A. M. Craven.

● TELEVISION promises to "turn the corner" at last early in 1940, according to latest reports. First—RCA has just demonstrated a new lightweight portable television field pick-up set with which "action shots" can be televised even with poor light. Second—As one of the accompanying photos shows, the General Electric television station at Schenectady recently had a "shake-down" demonstration test, and will most probably go on the air early in the new year. Third—It is rumored that the big networks —NBC and CBS—will go on the air with sponsored television programs very shortly under a new ruling by the FCC. Fourth—There are strong unofficial reports that television chains or networks are about to get under way. One flash is that CBS will open a television broadcast station in Philadelphia at the same time they go on the air in New York, probably about February 1st. One of the latest and most important angles on television networks comes from Major Edwin Armstrong, of frequency modulation fame. According to one source of information, radio engineers stated in a recent interview that a successful *no-wire* network transmission for television, using *frequency modulation*, could, in all probability, be put into operation. Major Armstrong himself is said to have further indicated that "when there is a television chain, it will be done with *frequency modulation*. The technical principles are the same in television as in frequency modulation." The Major also revealed that by the summer of 1940, twenty-five frequency modulated *staticless* stations would be in operation.

Television has been badly in need of a new pick-up unit, one that would not require an expensive mobile truck set-up, and also an apparatus that would be more sensitive under weak lighting conditions. The new portable television image pick-up, here illustrated, is assembled in small individual carrying cases weighing from 35 to 72 pounds; total weight is 275 pounds. The basic one-camera unit may be converted into a two-camera assembly by adding a second television camera (pick-up) and four carrying cases, bringing the total weight to 548 pounds. With the addition of a third camera and with 1000 feet of special cable to serve the assembly, the total weight is only 1500 pounds, and the various

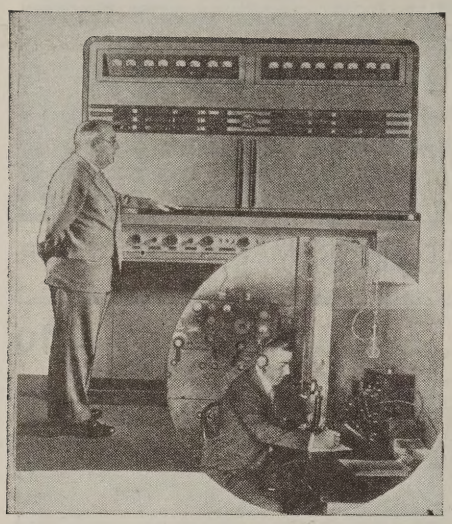
(Continued on page 613)

Picture below shows location of G.E. television station with nearby cities of Albany, Troy and Schenectady.



These photos show original Rotary Club dinner (inset is television image, as seen on distant television receiver).

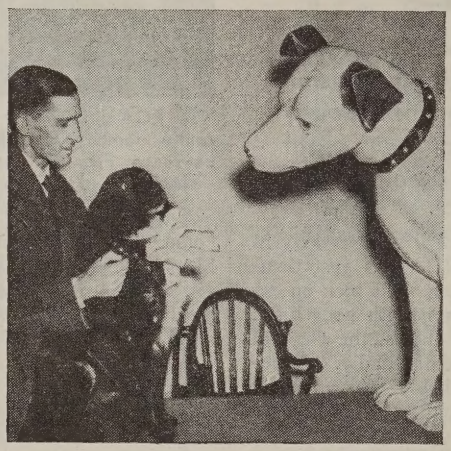
WORLD WIDE RADIO DIGEST

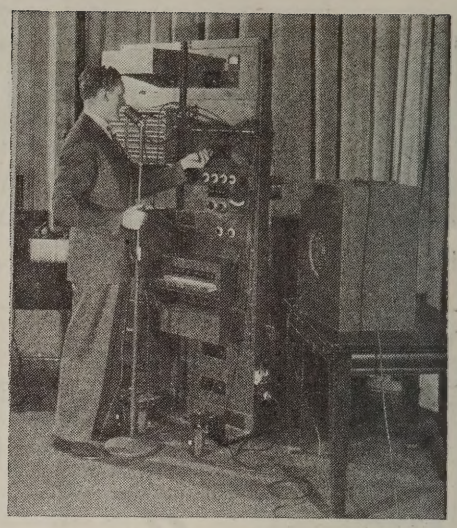


EIGHTEEN YEARS of progress is illustrated in the two photos of G. W. Hayes, above. The upper picture shows Mr. Hayes, now general manager of RCA-Victor Argentina, inspecting a television transmitter at Camden; below, he is seen at the controls of the company's first broadcast transmitter during its tests just prior to the Dempsey-Carpentier fight in 1921.

FEWER TUBE TYPES (to make things easier for the industry) is the latest standardization plan. A recent survey conducted by L. W. Teegarden of RCA reveals that though 453 different types are manufactured, 90% of all sales are centered in 90 types, for which but 20 functions exist. RCA engineers are working on a list of 36 tube types to fill all needs in A.C., A.C.-D.C., auto, and battery operated radios. The new RCA line will be designed to use tubes from this list. This standardization will help dealers reduce their tube inventories.

MIKE FRIGHT affects dogs as well as people, and this was proven when Duke (center) was brought to WCAM by his owner, G. A. Schwoeri, from whose store the pup had routed three bandits. Although Duke had won a gold medal for this exploit, he was too frightened to speak when he faced the microphone, so an RCA transcription of his bark was played.



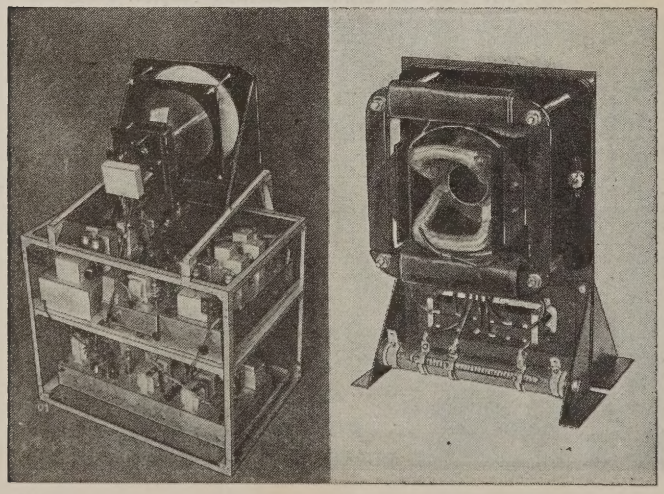


PEDRO, THE VODER, hit of both World's Fairs, was a child of the "Vocoder," pictured above. This is a device used for analyzing and remaking speech, and contains an analyzer synthesizer together with 10 spectrum analyzing channels covering a frequency range from 0 to 2950 cycles. The device is used to make tests of reproducing instruments, and to analyze the speech of 'phone operators.

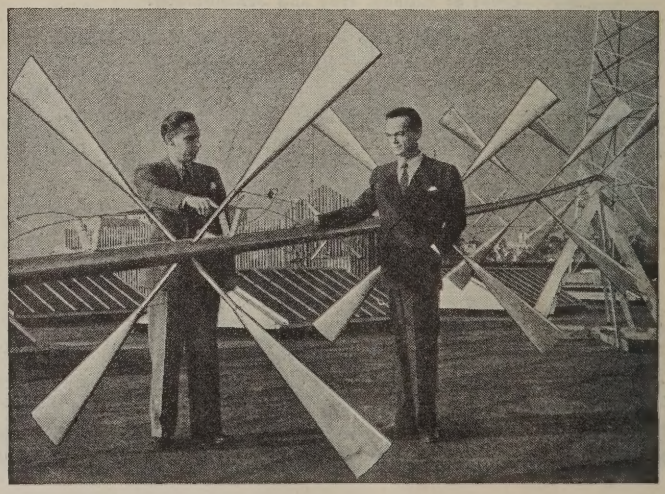
SOS AND SSSS are both being used by marine operators as calls of distress. Although the latter is not internationally recognized as is SOS, it is rivaling the older call in frequency of use. Contrary to rumor, it does not officially mean "submarine sighted" or anything else. It is merely three dots repeated four times and has a characteristic, easily recognized swing.

The old familiar CQD, used for so many years, was likewise meaningless, and did not stand for "Come Quick—Danger."

ITALIAN TELEVISION is represented in the pictures below, which show a model produced by Allocchio, Bacchini & Co. At the left is a view of the chassis. The upper shelf contains the vision receiver, the synchronizing and sweep circuits, and the sound receiver. On the lower shelf is the power-supply for both units. The vision receiver is an ultra-short wave superheterodyne with a stage of R.F. and two stages of intermediate frequency. Electro-magnetic scanning is employed in the receiver, and a close-up of its deflecting yoke is given at the lower right. This yoke appears to be ingeniously constructed, although it would seem that size adjustments are less conveniently made than on American models; voltages are apparently varied by a tubular resistor.



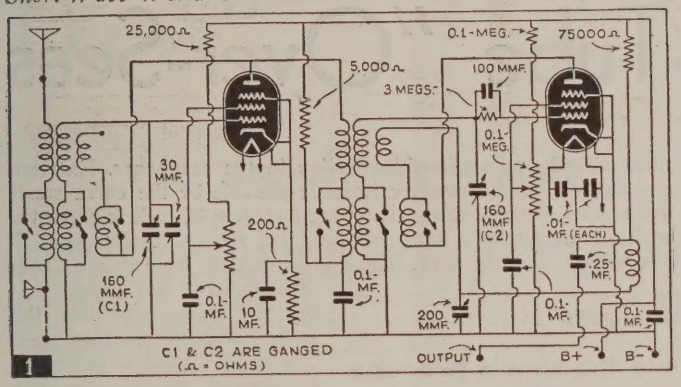
WINDMILL ANTENNA might be used to describe the new array being installed at the Thomas S. Lee station, W6XAO, Hollywood, Calif. According to company engineers, the paddle shape of the blade is designed to give greater definition to television images on a wide broadcasting band. The antenna will be 60 feet tall when erected, and is made of duraluminum. Company engineers believe that when it is set upright on the roof of the building which houses the transmitter, the horizontal paddles, which give it its windmill appearance, will spread signals over a wider ground area. Left to right, with the new antenna, are Harry F. Lubcke, the station's director, and Thomas S. Lee, its owner. It is estimated that there are about 600 sets in the area.



International Radio Review

Short Wave Adapter

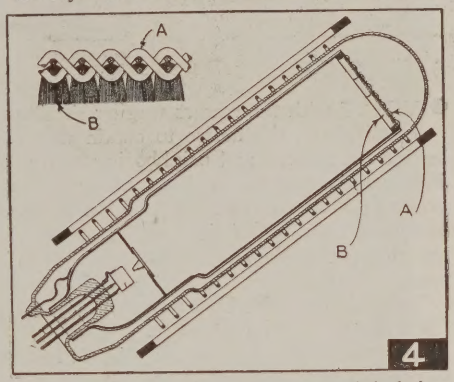
1 A HIGHLY sensitive adapter, which can be used in conjunction with any A.C. broadcast receiver to enable it to pick up high-frequency transmissions, is described in *Electronics and Television & Short-Wave World* of Britain. The coils employed provide coverage from 12 to 60 meters when tuned by a 160 mmf. condenser and are of the standard commercial type. The tubes are A.C. pentodes of whatever series matches the filament voltage of the set with which the adapter, shown in Fig. 1, is to be used. Their heater voltage is drawn by tapping leads of the receiver.



In constructing this unit, the two stages are kept well separated, the tuning condensers being ganged by means of flexible couplers and an extension shaft. The R.F. stage is placed at the rear of the detector stage. As in all short wave work, the coils should be kept well away from the shields and all leads should be as short as possible.

Incandescent C-R Tube

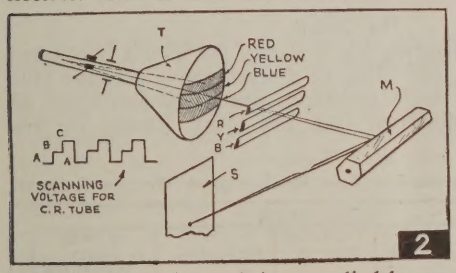
4 PHILO T. FARNSWORTH and B. C. Gardner have recently secured a U.S. patent on a high intensity cathode ray tube for projection purposes. The internal screen is an oxide impregnated fabric, preferably rayon velvet of very short weave and fine pile. After its impregnation, the velvet is burnt away leaving the crystal structure. This is scanned by an



electron beam, the tube potential being about 5,000 to 7,000 volts. The construction is seen in Fig. 4.

Television in Colors

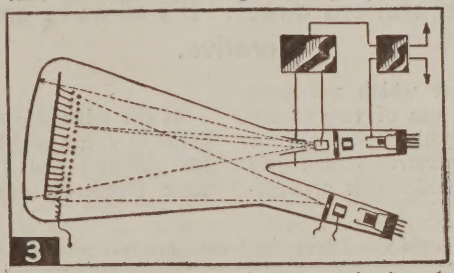
2 A BRITISH patent has been granted Kolster Brandes, Ltd., for a cathode-ray method of reproducing television in natural colors, according to *Electronics and Television & Short-Wave World*. In this system, which Fig. 2 illustrates, the electron beam is used for horizontal scan



only, the vertical scan being supplied by an external mirror drum. Each line is repeated thrice (once for each primary color), the vertical deflecting peaks providing this action. This causes the beam of light to pass through filters and cylindrical lenses thus producing full color images on the screen.

Television Receiving Tube

3 A U.S. PATENT has just been granted to Pierre Toulon, of France, for a new type of television receiving tube in which two separate "guns" each



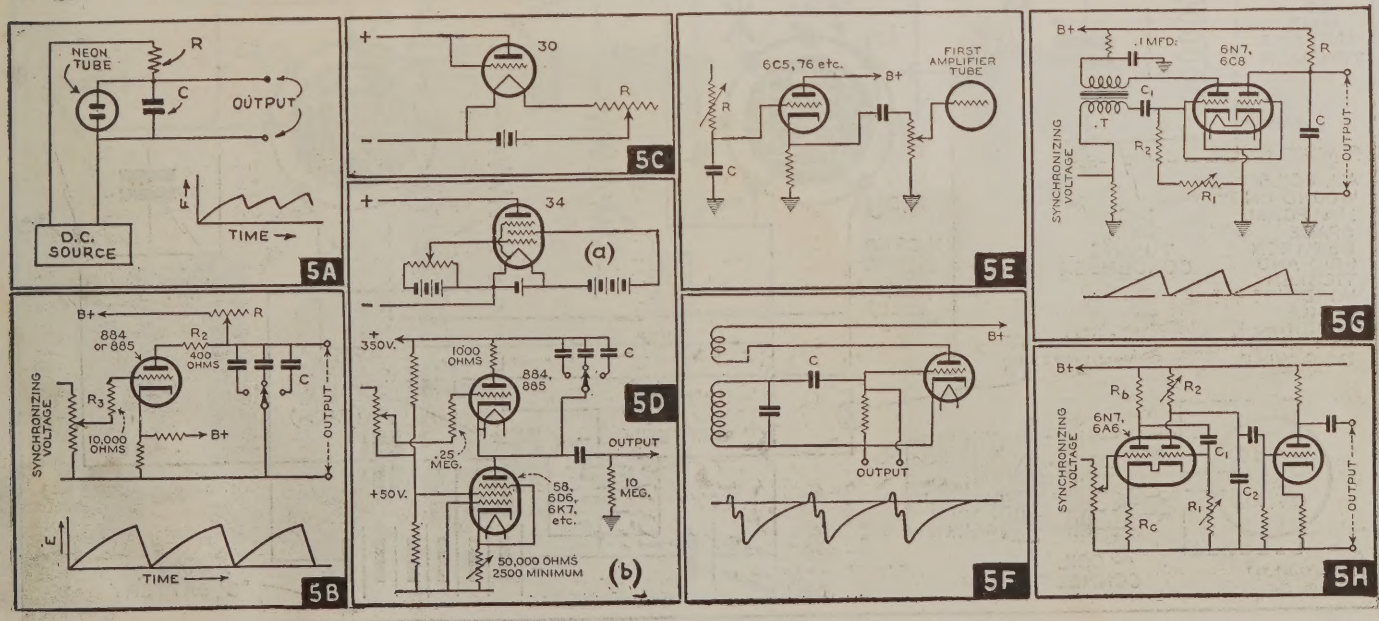
emit their own electronic beams. A slatted collecting grid is arranged between these guns and the usual fluorescent screen, as Fig. 3 shows.

The inventor claims that his system permits a low intensity electronic beam to be used, thus prolonging the life of tube. He further states that flicker is suppressed and that a greater effective brilliancy can be secured due to the fact that the screen remains luminous during a longer period.

Sweep Circuits

5 A WIDE variety of sweep circuits for television have been described in the *Aerovox Research Worker* and are reproduced in Fig. 5. Referring to this diagram, Fig. 5A shows how a saw-tooth wave form may be produced by a neon tube with associated resistor and condenser. The wave produced is also shown. This circuit, however, has several disadvantages which are not found when a gaseous triode is used in a circuit like that shown in Fig. 5B. If a constant current device is used to replace the resistor in these figures, using a system like that shown in 5C, a linear forward stroke is obtained. Better regulation, however, is had by using a pentode, as Fig. 5D illustrates. A phase shift-free amplifier for use with these oscillators appears at 5E. Fig. 5F depicts a self-quenching oscillator more suitable for use at the higher frequencies required, and Fig. 5G indicates

(Continued on page 608)



HEAR WAR NEWS DIRECT

2-Tube "Over-Seas

● WHAT with three wars waging simultaneously on the Eastern Hemisphere, the desire to obtain war news directly from the belligerent nations and neighboring states has become quite keen. Propaganda, playing an important role, is rife on all sides. In order to form an intelligent opinion of the important happenings one must listen to *all* sides of the story, *directly* from their points of origin.

This is where our Overseas "War News" special comes in. This little 2-tuber was so designed as to be a *personal* war-news getter. So small and compact is it that it can be conveniently placed on the night table for *news* reception during the night or on the office desk for daytime use.

L. F. Rodgers

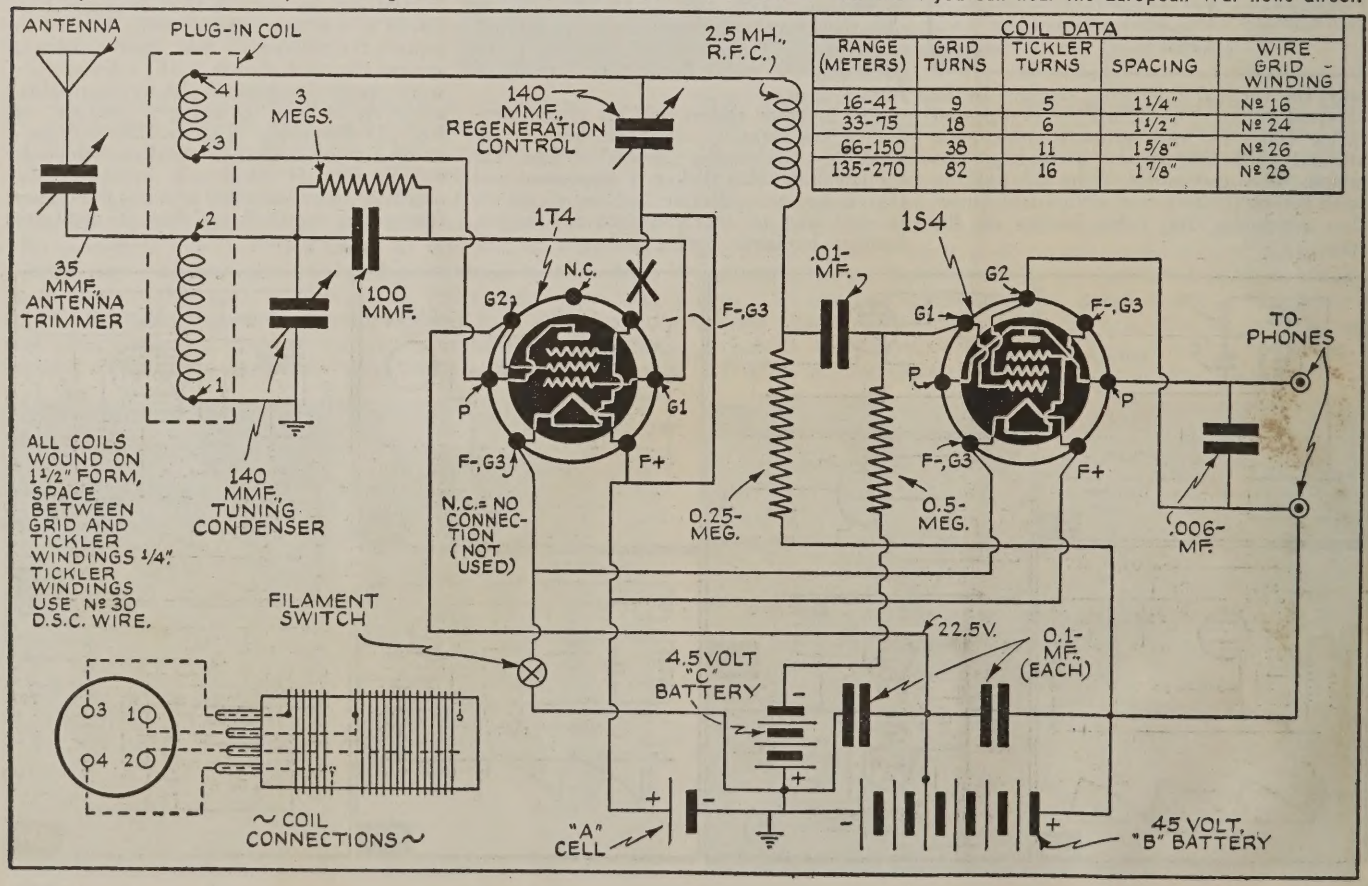
tells you how to build and use this simple two-tube portable battery receiver. It uses the latest RCA low-drain, high efficiency tubes and will—believe it or not—pick up European and other DX short-wave broadcast stations direct. It's all-wave and regenerative.

There are several features about this set which are quite interesting. Most important of these is the use of two of the new series of RCA 1.4 volt, low-drain, Lilliputian tubes viz. the 1T4 RF pentode which is used as a regenerative screen grid detector and the 1S4 as a power output pentode. This arrangement affords quite a healthy wallop in the earphones. Extreme compactness of the receiver is made possible by the extra small dimensions of these tubes. They are less than ¾ inch in diameter with an overall bulb length of only 1¾ inches. Special small 7 pin sockets must be used. These are available from either Cinch or Amphenol, the former being the wafer type and the latter being the moulded type. The entire chassis including all components are so compactly arranged that they fit snugly into a standard 4" x 6" card filing case, the batteries consisting of one 45 V. "B" block and a single 1.5 V. flashlight cell fit into the bottom of the case.

The Circuit

As the schematic diagram Fig 1 shows, the circuit is conventional in every detail, consisting of a regenerative detector (the RF pentode) and a single resistance-capacity-coupled stage of audio frequency amplification (the 1S4 tube). Except for the

It's easy, with the aid of the picture diagram, to build this 2-tube short-wave receiver with which you can hear the European War news direct.


ANTENNA
PLUG-IN COIL
2.5 MH., R.F.C.)
3 MEGS.
140 MMF., REGENERATION CONTROL
1T4
1S4
35 MMF., ANTENNA TRIMMER
100 MMF.
.01-MF.
TO PHONES
ALL COILS WOUND ON 1½" FORM, SPACE BETWEEN GRID AND TICKLER WINDINGS ¼". TICKLER WINDINGS USE № 30 D.S.C. WIRE.
140 MMF., TUNING CONDENSER
N.C.= NO CONNECTION (NOT USED)
0.25-MEG.
0.5-MEG.
.006-MF.
FILAMENT SWITCH
22.5V.
0.1-MF. (EACH)
4.5 VOLT "C" BATTERY
~ COIL CONNECTIONS ~
"A" CELL
45 VOLT "B" BATTERY
COIL DATA
RANGE (METERS) | GRID TURNS | TICKLER TURNS | SPACING | WIRE GRID - WINDING
16-41 | 9 | 5 | 1¼" | № 16
33-75 | 18 | 6 | 1½" | № 24
66-150 | 38 | 11 | 1⅝" | № 26
135-270 | 82 | 16 | 1⅞" | № 28

from EUROPE On this Dx-er"

Via the *Short Waves*

Why not listen to the European short-wave propaganda and hear official War news direct? You can do this easily with the 2-tube special receiver here described.

fact that these tubes employ different pin connections they are, for all practical purposes, similar in characteristics to their 1.4 V. counterparts of standard size. Regeneration is obtained by means of the usual tickler coil in the plate circuit of the 1T4 and is controlled by a 140 mmf. variable condenser which is identical with the tuning condenser. No screen grid resistor is used inasmuch as the "B" battery has a 22½ V. tap. The antenna is coupled to the grid circuit of the detector through the usual trimmer condenser, 35 mmf. Four plug-in coils are used to cover the range of 16 to 200 meters without skipping. An additional coil may be used to cover a portion of the broadcast band. Three 1.5 volt pen flashlight batteries, in series connection, supply 4.5 volts for grid bias of the power pentode.

Parts Layout

As will be seen by reference to the photographs, the entire chassis is made by one piece of aluminum 6" x 5" and 1/16" thick. This sheet is bent as shown in the illustration at an angle of 90 degrees to form a top panel 6" x 3" and a 2" x 6" shoulder. All components are mounted on the panel except the tube and coil sockets. These are suspended from the top panel in such a manner that only ¾" of each tube protrudes through the panel. This goes for the plug-in coil too. The tuning condenser is mounted on the right-hand side of the panel and the regeneration control on the left-hand side forming a symmetrical arrangement. The antenna condenser is mounted between the two tubes and is controlled by a knob instead of the usual slotted nut. The antenna and ground leads enter the box through a small hole in the back. The filament "on-off" switch is also located on the back of the cabinet.

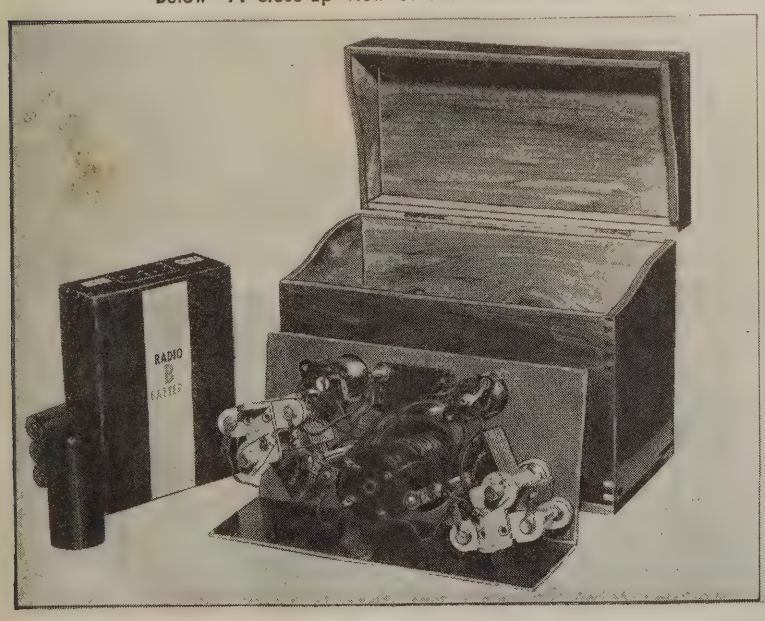
It is suggested that the constructor follow this layout as closely as possible inasmuch as the components have been mounted in such a manner as to be not only symmetrical but also to afford shortest possible connections between them. No dial plates are used. Two scales are marked in India ink on the aluminum front panel for the tuning and the regeneration controls. These are arbitrarily calibrated from 0-100 in a 180 degree arc.

Operation

When all wiring has been completed and checked, connect the "A" and "B" batteries to their respective leads. Plug the 16 to 32 meter plug-in coil into its socket, attach antenna and ground leads and plug in the headphones. Now, at the flip of the fila-

(Continued on page 614)

Below—A close-up view of the 2-tube chassis and another "shot" of the complete receiver with headphones.



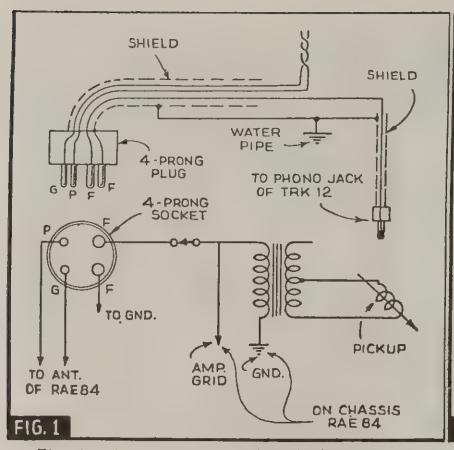


Fig. 1—Antenna, ground and phono cable.

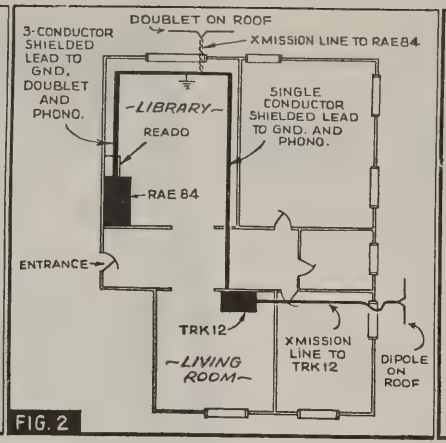


Fig. 2—Path of wiring through house.

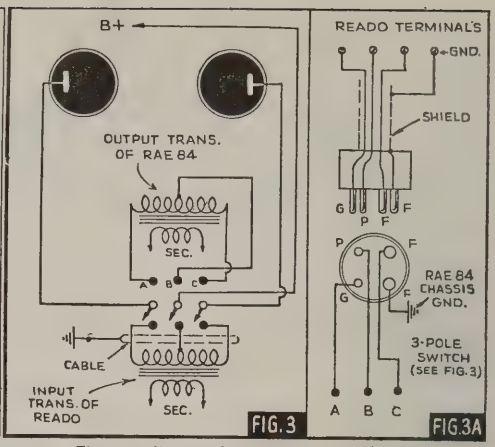


Fig. 3—Facsimile switch-over system.

Editor Builds Ideal Installation

Television • Facsimile • Radio • Phono • Recording

Robert Eichberg

• ALTHOUGH the writer's home is not a particularly large one, it was desired to operate an RCA TRK-12 television receiver in the living room and to have a phono-radio (RAE-84) located in the library some distance away.

Additional problems of installation were that a good ground was available in the library, but not convenient either to the TRK-12 or the RAE-84. The diagram, Fig. 2, shows the location of the apparatus, the TRK-12 being installed in a position formerly occupied by the phono-radio combination.

As the antenna used for broadcast reception was originally a *single straight wire* antenna, feeding into an auto-transformer and thence, through a shielded lead, directly to the set at the position now occupied by the television receiver, a shielded line had been installed through the walls of the building from the library to the living room. The television receiver has provision for broadcast and all-wave reception but does not include a built-in phonograph unit, and it was desired to play records through it by means of the automatic record player in the older set.

To complicate the problem still further, the writer made a slight change in the phono-radio to enable it to operate on a doublet antenna when he installed a short wave converter in one of the phonograph record compartments, as shown below. The problem now was to connect the doublet to the phono-radio and the output of the pick-up to the TRK-12 in an efficient manner, yet without having to do additional installation work through the walls of the building.

With this outfit one is able to—

1. *Witness television programs.*
2. *Listen to broadcasts on all waves from 10 to 540 meters.*
3. *Play phonograph records automatically through either receiver.*
4. *Operate a facsimile receiver merely by throwing a single switch.*
5. *Record programs received on any frequency within the range previously mentioned. (The RAE84 has provision for this.)*
6. *Make "home broadcasts" through the amplifying system of the television receiver.*
7. *Make home recordings on phonograph records by means of the microphone.*

Rather a versatile job, eh?

In other words, the writer wanted a good set-up—without much work.

Shielded Leads

After giving considerable thought to the installation, he secured 50 feet of Corwico rubber-covered shielded 3-conductor cable. This was connected as shown in Fig. 1. One pair of leads was used to connect the doublet to the antenna coil of the phono-radio; the remaining lead was used to carry the high side of the pick-up to the central wire of the single shielded conductor lead already installed. All of these leads were, of course, brought to the window which was the point of entry of the doublet, as well as the location of the excellent ground. The shields, both in the single conductor and the 3-conductor cable, served as ground leads—fortunately one side of the pick-up transformer was grounded.

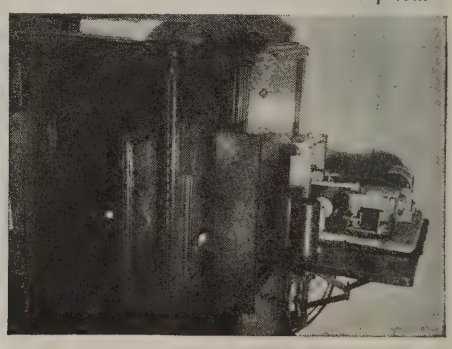
In order to simplify connections to the phono-radio, a 4-prong socket and an Amphenol plug were used to make the connections. The cable was connected to the plug, and the socket had its two small prongs connected to the two sides of the antenna coil, while one large prong was grounded and the other connected to the high side of the pick-up transformer through a S.P.S.T. switch. A Walco sapphire point needle is used.

(Continued on page 609)

No visible wiring mars this installation.

Author's photograph of received image.

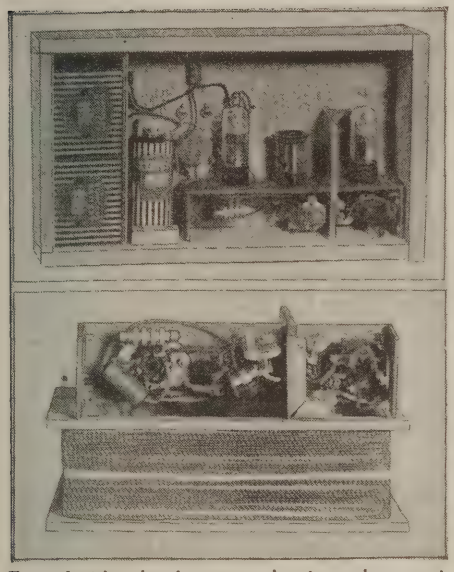
Just throw a switch for facsimile reception.



Practical Metal & Ore Locator

G. M. Bettis

Weighing under 10 pounds, this super-searcher is so sensitive that it can detect a metal pipe five feet underground.



Top—Inside the Locator, showing placement of parts. Below—Bottom view of chassis and the "loop" antenna.

● THE desire for a metal or treasure locator that was light, stable, sensitive, simple to operate, that could be constructed of standard radio parts using new low-drain tubes, and possible to use in a wide range of places was the reason for the design and building of the locator shown.

The locator consists of the transmitter on a low frequency which is adjustable well below the broadcast band and a regenerative receiver tuned to one of the *harmonics* of the transmitter, which increases the sensitivity of the locator very much.

One photo shows the locator as carried in use with the small loop. There is also a large loop for use where a greater area is to be covered.

A second picture shows an inside close up view of the locator, with arrangement of parts and batteries. The parts are standard radio parts that can easily be bought from a dealer in radio supplies and with a little patience and care in constructing can be made to perform with surprising results. A third photograph shows the under side of the chassis which is shown on the small loop.

The diagrams are self explanatory, and were prepared with as much detail as is needed for proper construction. Careful construction will be well worth while as the locator is free from body capacity effects; it is necessary to touch some of the essential parts before the squeals that are common among this type instrument are caused.

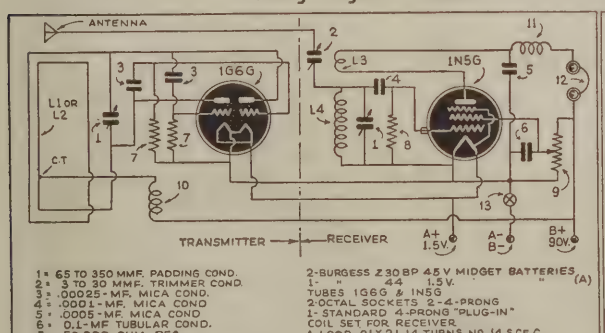
Designed for use in brush country, the unit is light and compact.

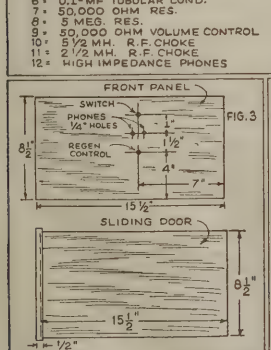
Construction

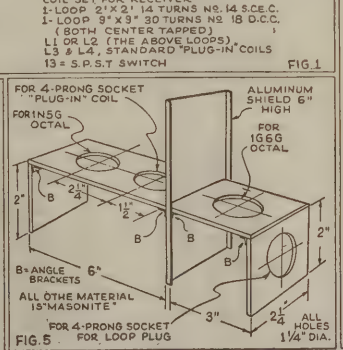
The box and wood work for this locator can be made by a local cabinet maker for a small sum. The box is of ½" white pine with panels of ¼" plywood. The loops are constructed as shown, and the loop's frame work is *glued* together, thereby keeping metal to a minimum. The front panel is glued in the grooves and the end pieces of the box are made fast with brass screws. The top loop support is held in place with a bolt through the top of the box and wing nut; also a ¼" dowel pin is glued in the end piece of the box and goes through a hole in the loop support. The lower loop support is hinged to the box with a small brass hinge. There is a ¼" dowel rod through the top of the box into a recessed hole in the bottom just in front of the two 45 volt "B" batteries to hold them in place. Two small blocks of wood hold the 1½ volt "A" battery.

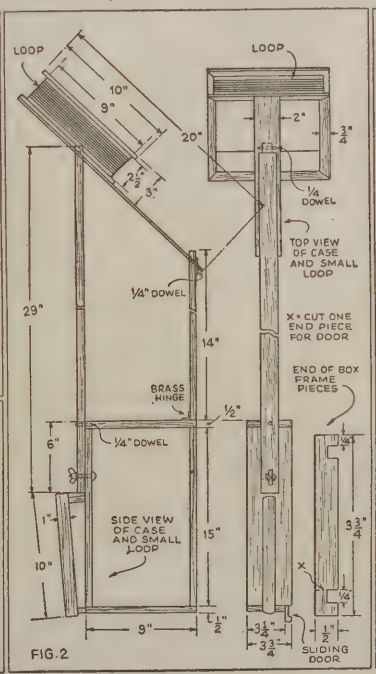
(Continued on page 612)

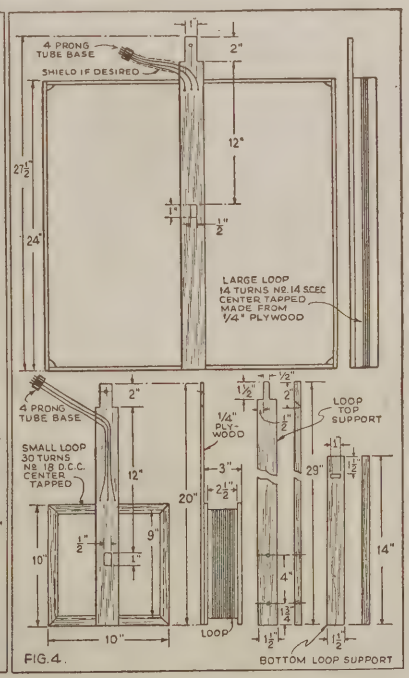
Wiring diagram of Metal and Ore Locator; complete list of parts appears at end of article.


ANTENNA
L1 OR L2
C.T
1G6G
1N5G
L3
L4
TRANSMITTER
RECEIVER
A+ 1.5V
A- B-
B+ 90V
1 = 65 TO 350 MMF. PADDING COND.
2 = 3 TO 30 MMF. TRIMMER COND.
3 = .00025-MF. MICA COND.
4 = .0001-MF. MICA COND
5 = .0005-MF. MICA COND
6 = 0.1-MF TUBULAR COND.
7 = 50,000 OHM RES.
8 = 5 MEG. RES.
9 = 50,000 OHM VOLUME CONTROL
10 = 5½ MH. R.F. CHOKE
11 = 2½ MH. R.F. CHOKE
12 = HIGH IMPEDANCE PHONES
2-BURGESS Z30BP 45 V MIDGET BATTERIES (A)
1- " 44 1.5 V. "
TUBES 1G6G & 1N5G
2-OCTAL SOCKETS 2-4-PRONG
1-STANDARD 4-PRONG "PLUG-IN" COIL SET FOR RECEIVER
1-LOOP 2"X2" 14 TURNS NO. 14 S.C.E.C.
1-LOOP 9"X9" 30 TURNS NO 18 D.C.C. (BOTH CENTER TAPPED)
L1 OR L2 (THE ABOVE LOOPS)
L3 & L4, STANDARD "PLUG-IN" COILS
13 = S.P.S.T SWITCH
FIG. 1




FOR 4-PRONG SOCKET "PLUG-IN" COIL
FOR 1N5G OCTAL
ALUMINUM SHIELD 6" HIGH
FOR 1G6G OCTAL
B = ANGLE BRACKETS
ALL OTHE MATERIAL IS "MASONITE"
FOR 4-PRONG SOCKET FOR LOOP PLUG
ALL HOLES 1¼" DIA.
FIG. 5




4 PRONG TUBE BASE
SHIELD IF DESIRED
LARGE LOOP 14 TURNS NO. 14 SCEC CENTER TAPPED MADE FROM ¼" PLYWOOD
4 PRONG TUBE BASE
SMALL LOOP 30 TURNS NO. 18 D.C.C. CENTER TAPPED
¼" PLY-WOOD
LOOP TOP SUPPORT
LOOP
BOTTOM LOOP SUPPORT
FIG. 4

"Doc" Secor is here giving a treatment to a "patient." The electrodes shown are encased in washable cloth bags in order to absorb moisture. The left-hand knob controls the power output or "tuning," the right-hand knob is the 0—30 minute time twitch.

Extra Money for the *"Ham"* By Way of SHORT-WAVE Diathermy

Allan Stuart

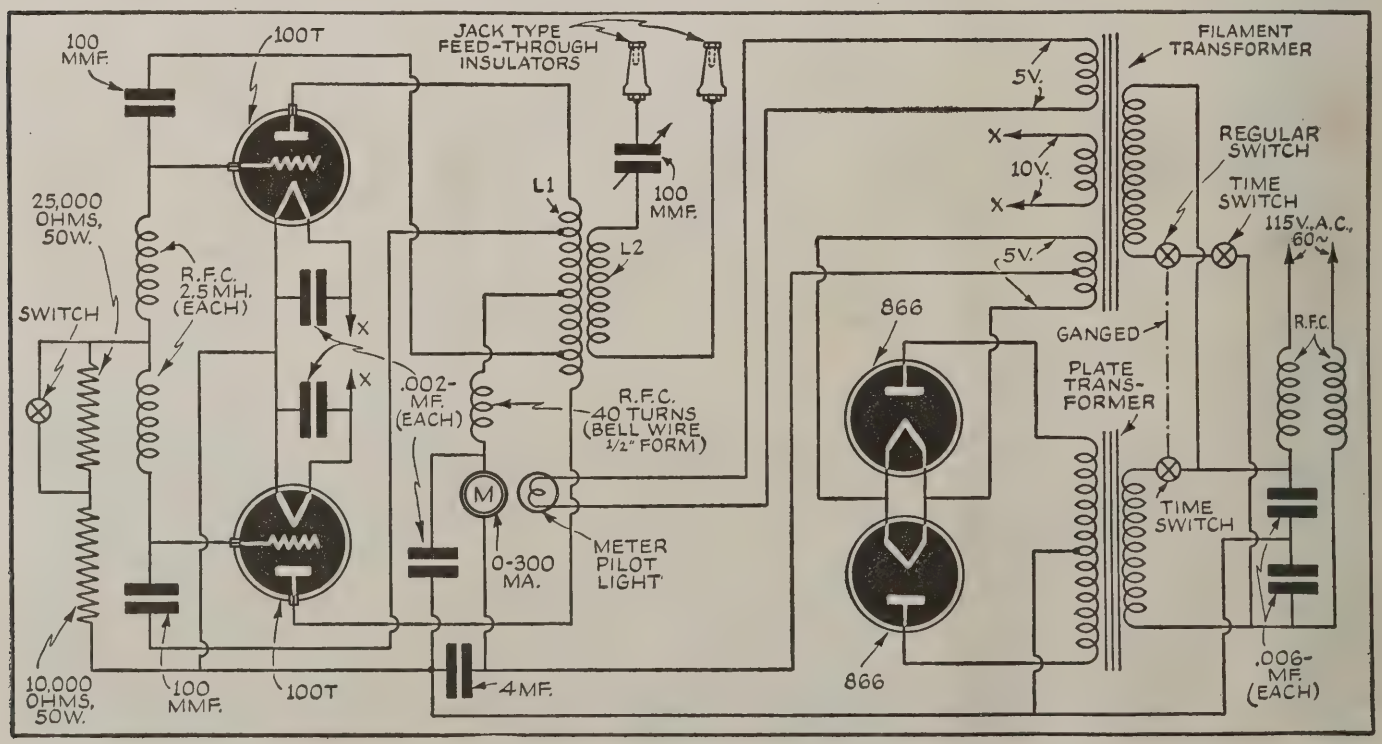
● WANT to make some extra money, fellows? Here is a sure way, an easy way, and a way which is right up your alley. It's building short-wave transmitters; and I guess you know how to do that! These transmitters, however, are not for chewing the rag over the air; they're for curing people of various types of illnesses. Outside of this distinction, the transmitters are no different from a high quality job putting out an unmodulated R.F. signal of between 200 and 300 watts. Build them and sell them to the M.D.'s; that's all!

Not as easy as it sounds? Well, listen to this! The machine described in this very article has already been sold! Need I say more?

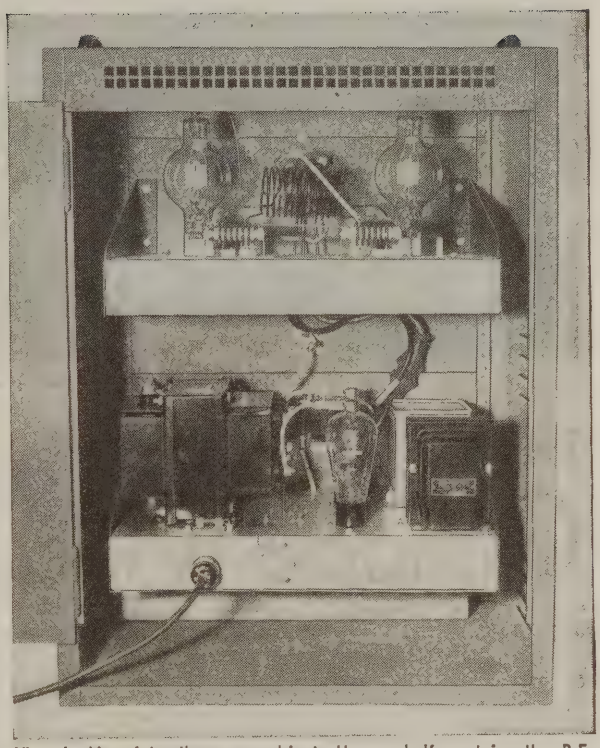
Whom to Sell

From the very start you will have an active competitor in the form of factory-built machines. Don't worry about it! These machines are made to sell at $300 to $500 for the average type, up to $3000 for the more elaborate models. You can sell your neat looking, efficient machine for $198.98 and still make a nice profit on your *spare-time* work. Factories must add overhead, labor, depreciation and other expenses to the price of their machines. You have none of these expenses save your own personal

Fig. 1. Complete schematic diagram of the short-wave therapy machine. A stable push-pull Hartley oscillator circuit is used.



Every radio set builder, and especially the "ham," should be able to build one or more of these short-wave diathermy machines and make a handsome profit for himself. Thousands of physicians throughout the country have still to buy their first diathermy apparatus—this article tells how to build a powerful, well-regulated machine.



View looking into the rear cabinet. Upper shelf contains the R.F. oscillator circuit; and the lower, the power supply. Substantial construction is used throughout for maximum safety and stability of operation. The cabinet itself is mounted on four casters recessed into the bottom.

labor; and that's labor what isn't labor—it's pleasure (Hi!).

As a starter, your local physician is your best bet. He probably already knows that you are a government-licensed transmitting amateur, and if you will explain to him what I have explained above—that there is little difference between a good amateur transmitter and a short-wave therapy machine—your sale will be half made.

Some doctors may pooh-pooh you; may say that they have no faith in home-built apparatus. Don't let *that* phase you, for they are the fellows who probably have been "swindled" into buying one of those "guaranteed machines" thrown together by some experimenter or household mechanic who unscrupulously, and with dangerously little knowledge of the subject, peddle their wares to unsuspecting M.D.'s for whatever they can "catch." You can easily disarm these unfortunate medicos by offering them your therapy machine N.C.O.D. (No Cash On Delivery); in other words, on a *free trial basis,* anywhere from 10 to 30 days.

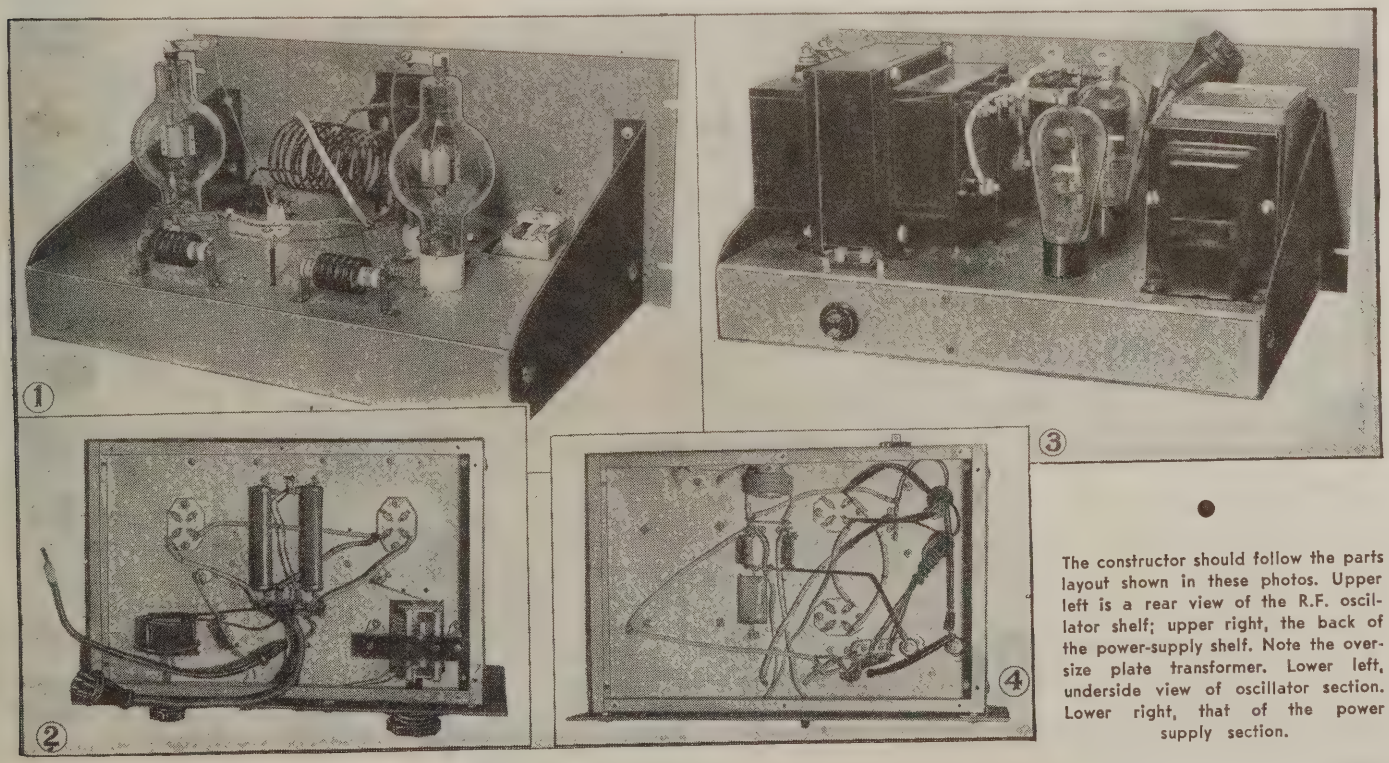
Having consummated your first sale, you are now set up in business (Hi!)—*and in your spare time.* If your machine is reliable (and it will be if patterned after the one described here) you will hear from other doctors pretty soon—recommendation business, you know. Then, too, since most physicians donate some of their time to hospital clinics and others are members of hospital staffs, it is not improbable that you will receive inquiries from private hospitals and sanitariums.

A Few Notes on Short-Wave Therapy

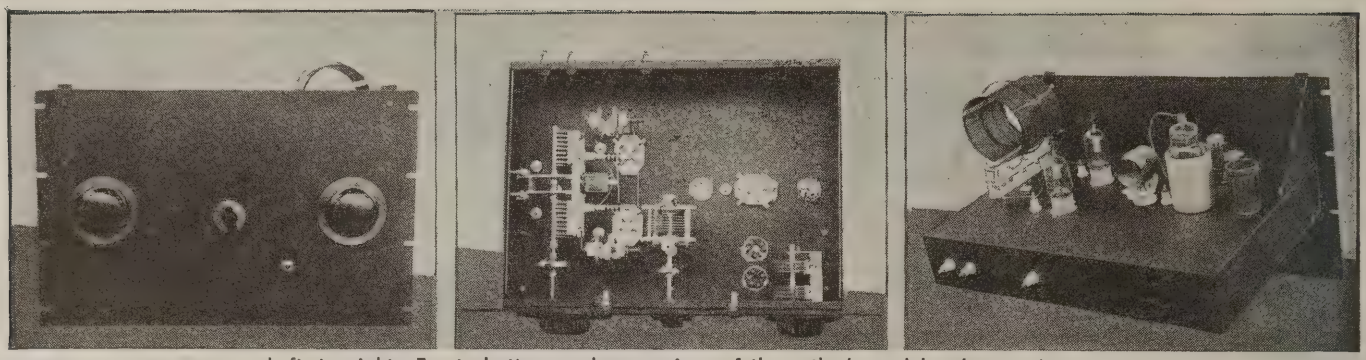
Numerous articles have appeared in the past, in this and other publications, on the subject of radio therapy. If you are interested, I refer you to the following articles in particular: *"Modern Short Wave Therapy"*—January, February and April issues of RADIO-CRAFT, 1937; *"Short Waves and Medicine"*—June and July issues of RADIO AND TELEVISION (then called SHORT WAVE CRAFT), 1930; *"Artificial Fever by Short Waves"*—August and September issues of RADIO AND TELEVISION (then called SHORT WAVE CRAFT), 1930; *"Short Wave Diathermy—Fact or Fancy"*—RADIO AND TELEVISION (then called SHORT WAVE AND TELEVISION), February, 1937.

Suffice it to say that radio therapy is used to treat certain ailments such as neuritis, neuralgia, mialgia, arthritis, nasal sinus infections, St. Vitus dance, sciatica, etc. The affected part of the patient is placed between two rubber-insulated metal electrodes, which are connected to the output circuit of the oscillator. The position of these pads may vary according to the nature, type, and area of the ailment. In all cases, however, some absorbent material is used between the pads and the body in order to absorb any moisture which may accumulate on the skin and tend to draw sparks from the high-frequency electrodes. These electrodes can be homemade affairs, but are better bought

(Continued on page 611)



The constructor should follow the parts layout shown in these photos. Upper left is a rear view of the R.F. oscillator shelf; upper right, the back of the power-supply shelf. Note the oversize plate transformer. Lower left, underside view of oscillator section. Lower right, that of the power supply section.



Left to right—Front, bottom and rear views of the cathode-modulated transmitter.

The "W8KPX"

Cathode-Modulated

TRANSMITTER—Part I—R.F. Section

This transmitter has been tested on the air by the author. It covers the 80, 40, 20 and 10 meter bands and can be used on 160 meters. Output 80 to 100 watts. Modulator will be described next month.

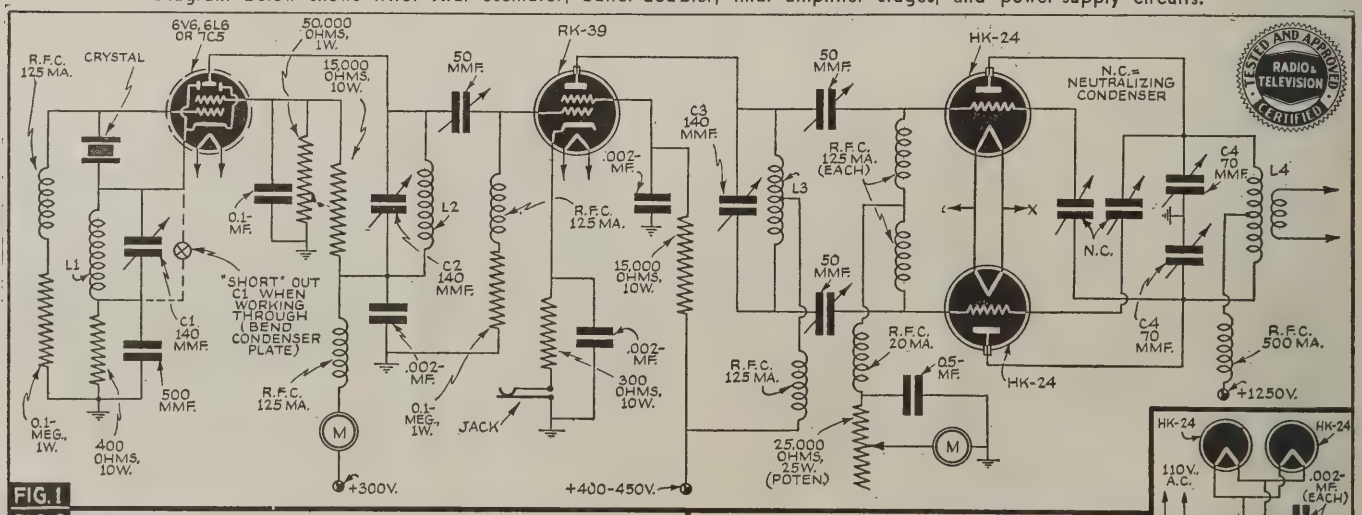
Harry D. Hooton, W8KPX

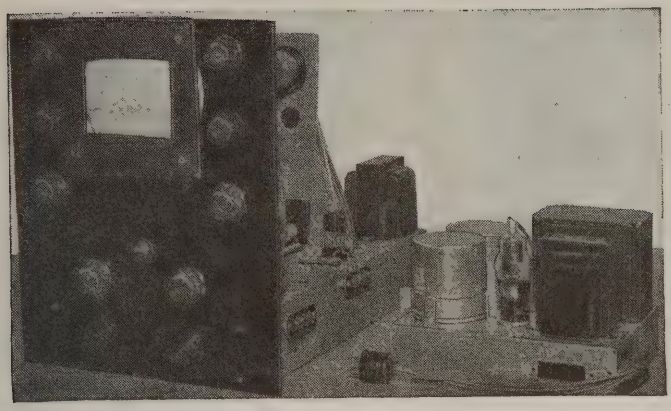
● THE transmitter to be described in this and the following articles was built with two objects in view: First, to provide a *completely self-contained phone and CW transmitter* of medium power input, small enough to be installed in the average city apartment and capable of efficient operation on all bands from 160 down to and including 10 meters; second, as an experiment to determine how practical in operation the new "cathode" type of modulation really is as compared with the more conventional methods which have been employed in the past.

Cathode modulation is a comparatively recent development in radiotelephony. Although the efficiency of a cathode-modulated transmitter is considerably lower than that of a similar set using conventional plate modulation, the cathode method is decidedly more economical for a given power input. In fact, it is perhaps the most economical method of modulating a high-power transmitter known today and without a doubt gives *more "phone watts output per dollar"* than either plate or grid modulation. In the cathode system of modulation, the audio-frequency power is fed to the cathode or filament circuit of the Class C R.F. amplifier, as shown in Fig. 1, which is common to both the grid and plate return circuits. The audio frequency voltage applied to the cathode circuit produces a small amount of plate modulation and a considerable degree of grid-bias modulation. The two types of modulation are in phase or, in other words, at a given instant both the plate and grid circuits are modulated in the same direction. If the diagram, Fig. 1, is carefully studied, it will be noticed that when the instantaneous audio frequency voltage across the 500 ohm winding of the modulation transformer becomes great enough to produce on the cathode a *positive* voltage which is exactly the same as increasing the negative bias on the amplifier grid, the radio frequency output will be reduced. The

(Continued on page 613)

Diagram below shows tritet Xtal oscillator, buffer-doubler, final amplifier stages, and power-supply circuits.

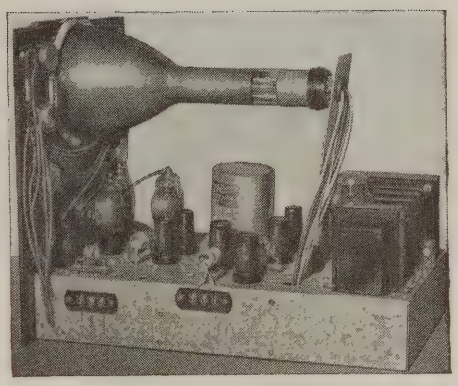




Left—R. & T. Television receiver, fitted with 5" vision tube. New high-voltage power-supply alongside it.

•

Side view of revamped R. & T. vision receiver with new 5" tube in place.



R. & T. 10-Tube Television with 5" Picture Tube

Ricardo Muñiz, E.E.
Assoc. A.I.E.E. Instructor Applied Elect. B'klyn Tech. H. S. Engineer WNYE, Board of Education Station. Faculty Advisor Television Club B.T.H.S.
Assisted by
Jerrier Haddad
Senior Student at B.T.H.S. Ex-President Television Club B.T.H.S.

Televisor which used 12 tubes, including "sound" section, now requires 14 tubes.

● THIS third and concluding article on the R. & T. Television Receiver, describes the changes necessary to use a 5" (about 3¼" x 4¼" image) Videotron in place of the 3" picture tube originally used in the set.

After having completed the 3" C-R tube job, we found ourselves wishing for *larger* pictures. The 3" televisor gave images about 2⅜" by 1¾". These pictures were pretty fair as long as only one person at a time was looking in, but were entirely too small for a group. In these early days of modern television what person who has a televisor can, or wants to, keep the enjoyment of the program from his family or friends? The solution is to use a bigger tube.

The National Union Videotron 5AP4/-1805P4 was selected, among other reasons, because its length was very little greater than the 9O6P4 tube previously used. It has a 5" diameter fluorescent screen, which fluoresces white when excited by the electron beam. The deflection sensitivity is less than that of 3" tubes and even less than that of the longer-type of 5" diameter tubes. It is necessary, therefore, to add amplifiers to the multivibrator sweep oscillators. Not only is the deflection sensitivity less but the distance which must be swept is greater. A 3" by 4" picture is produced on the 5" tube; thus, in the horizontal direction, it is necessary to sweep 4" instead of 2⅜". The use of a two stage amplifier following each sweep oscillator took care of the necessary sweep or deflection.

A 6F8G double triode was selected as sweep amplifier tube in each case, to cut down the total number of tubes in the finished set. A band width in the horizontal sweep amplifier of 150 kc. is desirable, as this will amplify the sawtooth scanning voltage wave with very little distortion or "rounding-off." The vertical sweep amplifier must pass a band of 720 cycles without distortion and must be flat down to 60 cycles. Resistance coupling was used with suitable values selected in each case to conform with these conditions. We have thus added two tubes to our original receiver. It was found impractical to attempt to sweep a 5" tube without these additional amplifiers. It might be possible to do without them by operating the multivibrators at a very high plate voltage. With the sweep amplifiers shown, the *size controls* were found to have more than enough range. These size controls did not appear on the original design because it is difficult to control the output of a multivibrator without also affecting its frequency. It is possible, however, to control size (voltage output) very easily *on these amplifiers* without affecting the sweep frequency of the multivibrators. The stiffness of the cathode ray beam in the Videotron is increased also by higher accelerating potentials used with this larger tube.

New High Voltage Power Supply

The higher accelerating potentials required for the larger tubes make necessary some changes in the high voltage power supply. It is necessary, in fact, to build a completely new unit. It was found that sufficient room was not available on the original chassis and therefore the new, higher voltage power pack was built as a separate unit. It is more or less recognized television practice to have the power supply on a separate chassis anyway, so this is not such a hardship. The filtering has been improved over that used on the original set with a view to making the hum level lower now that a bigger picture was being reproduced. A choke and two condensers were used and were found to do a superior job. (It would be possible to run without the

(Continued on page 607)

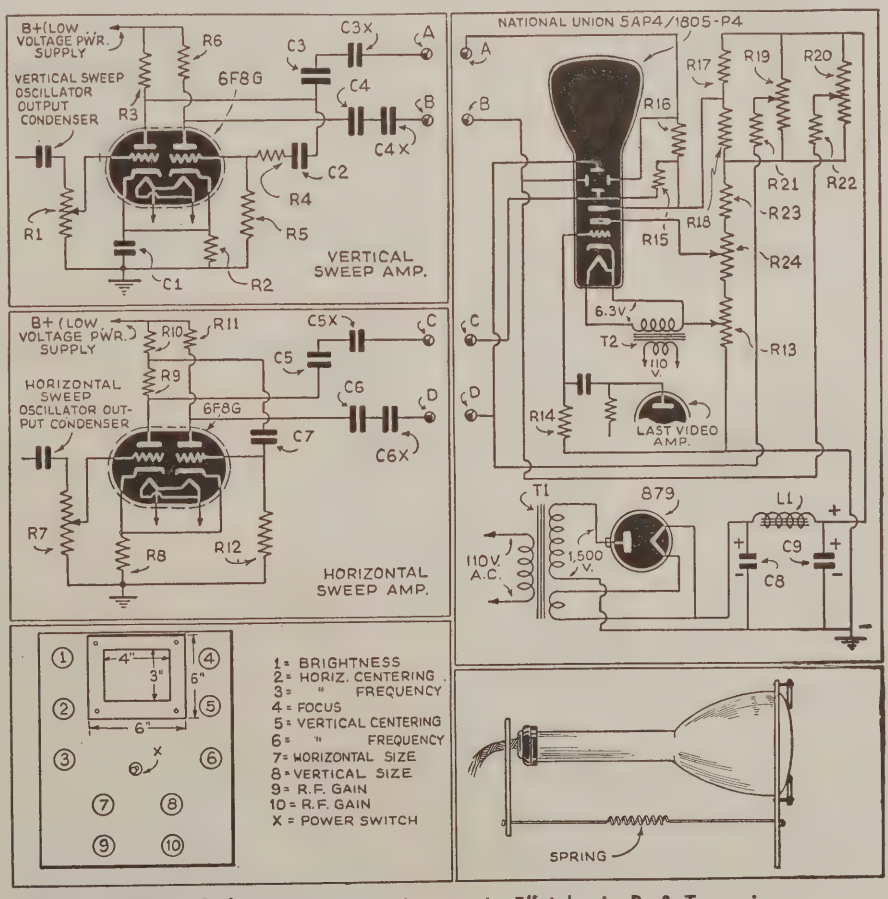


Diagram of changes necessary to operate 5" tube in R. & T. receiver.

Console type recorder, with folding "mike" stand and headphone monitor.

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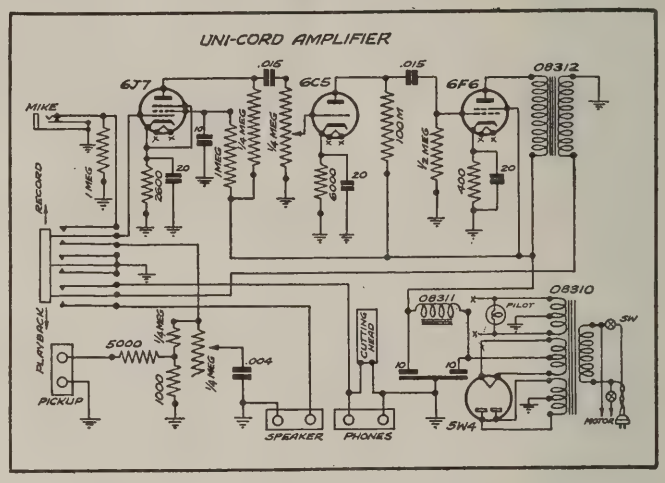
Not any more expensive to use as a hobby than almost any movie camera, the specially prepared blank discs in ten or twelve inch size make it possible for the average family to become home recorders for a hobby. Besides the console model, there is a portable model and the manufacturers will even furnish the chassis.

The home element is a minor portion of the uses for the machine

(Continued on page 609)



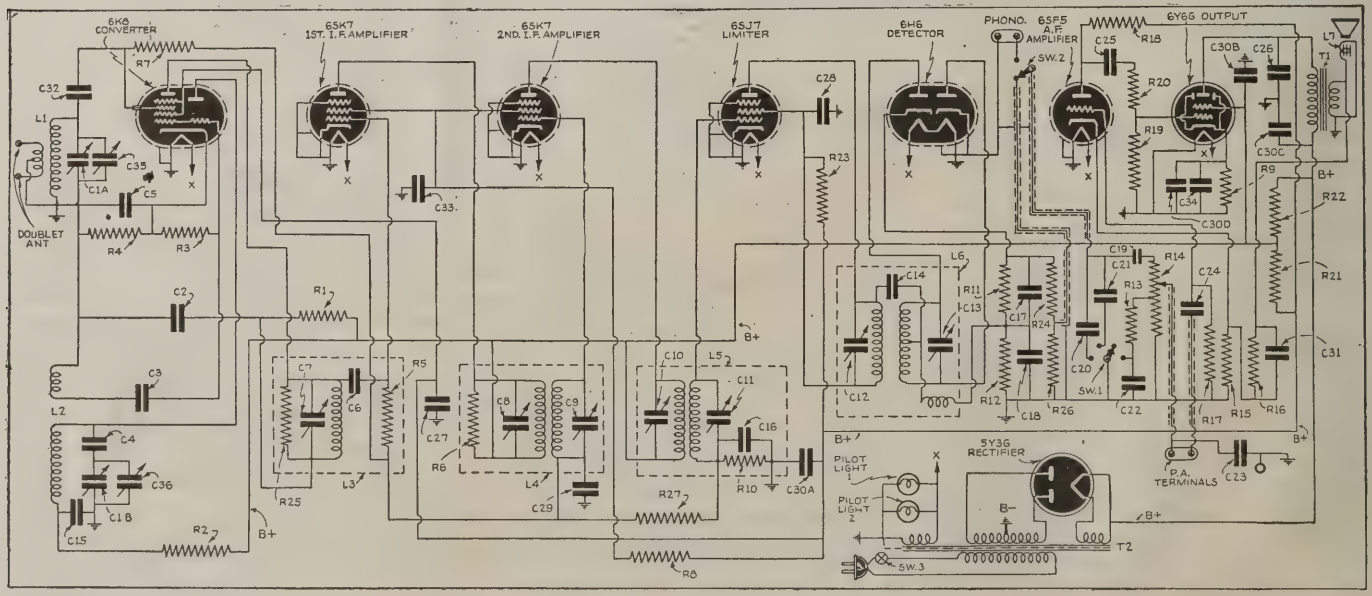
New Frequency Modulation Receivers

● STATIC-FREE radio, now being tested in the eastern portion of the United States, has brought forth a new line of receivers by the General Electric Company. Known as *Frequency Modulation Receivers,* these receive signals of that type sent out by the new Armstrong system. The new line includes model HM-80, which is an 8-tube table model for frequency modulation reception only and model HM-136, which not only receives the 39 to 44 mc. frequency modulation stations but also takes in the 39 to 44 mc., 7.5 to 22 mc. and 540 to 1700 kc. broadcast bands. The latter has push-button tuning.

Already station W2XMN at Alpine, N. J., is on the air with frequency modulated transmissions, and other stations are planned by the National Broadcasting Company, New York City; Bell

(Continued on page 606)

Diagram below shows line-up of new 8-tube Frequency Modulation Receiver.



Du Mont Demonstrates Large Image on 20-Inch Tube

● LARGE television images, measuring 11½" x 14½", were recently demonstrated at the Du Mont Television Laboratories, Passaic, N. J.

At the same demonstration, a brand new type of screen for the cathode-ray vision tube was shown—a new persistence screen. Those who saw the television image demonstrated on a 14" Du Mont tube, fitted with the new persistence screen, were quite enthusiastic, as this screen eliminated a lot of the flicker due to the black interval between successive images. Another thing that this screen does is to minimize the line effect noticeable (when viewed closely) on the average large television image, and it also permits reducing the number of complete images per second necessary for a satisfactory reproduction of the moving image. At the same demonstration, fifteen complete images per second were demonstrated without any noticeable flicker, and one of the advantages claimed for this reduction in the number of complete images necessary per second (compared to the present television standard of thirty complete images per second), is the fact that the number of scanning lines may be greatly increased and thus produce a higher fidelity image, while it still remains within the frequency band allowed by the F.C.C.

As one of the Du Mont engineers pointed out, another advantage of reducing the necessary number of images per second to 15, would also permit a television station to transmit a picture of the present standard fidelity but using only *one-half* the frequency band now necessary.

For standard tubes, producing images about 8" x 10", there was not such a noticeable improvement in the detail or fidelity of the images when the scanning was changed from 441 lines to 625 lines. However, when the images were scanned by 441 and then 625 lines, respectively, on the 20" tube (giving the large 11½" x 14½" image) the improvement in fidelity and detail was very noticeable. In other words, when you walked up close to the 20" tube receiver, the lines were very clearly defined with 440 line scanning, but they were just noticeable with the 625 line scanning. This would seem to indicate that tomorrow, when larger television images become commonplace on home-type receivers, we will presumably have to increase the scanning lines up to 600, or possibly 800 and more, in order to provide a high fidelity picture.

The average motion picture has an equivalent scanning line value of about 1000.

The highest anode potential used on the 20" tube is only 8,000 volts, the same as used on the 14" tube.

Elimination of Flicker: One of the chief drawbacks of the present method of transmitting television images, say the Du Mont engineers, is caused by the fact that the system depends upon the human eye to eliminate the flicker caused by the intermittent scanning of various screen areas of the cathode-ray tube.

This flicker, however, may be just as simply eliminated by using a cathode-ray tube which has a fluorescent screen having a persistence, or afterglow, characteristic which will permit an image to remain on a given screen area long after the electron beam has passed over that spot. If the persistence-versus-time characteristic be controlled, so that the phosphorescence, or after-glow, following fluorescence stays at a high value close to that during excitation for a period of 1/30 second and then drops rapidly to zero, no contrast will be lost and the flicker will be eliminated.—*H. W. S.*

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23. Design of R.F. Amplifiers and Tuning Coils.
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25. Loud Speakers.
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27. The Power Supply Unit.
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29. Automobile and Aircraft Receivers.
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31. Short Wave Reception.
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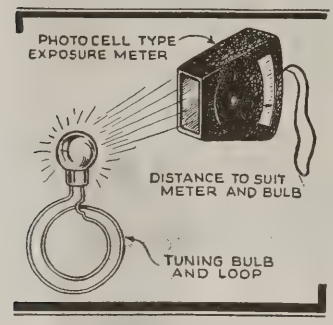
Radio Kinks

Each month the Editor will award a 2 years' subscription for the best kink submitted. All other kinks published will be awarded eight months' subscriptions to RADIO & TELEVISION. Read these kinks; they will be of real use to you, besides indicating what is wanted. Send a typewritten or ink description with sketch of your favorite to the Kink Editor

First Prize Winner

Tuning Transmitters

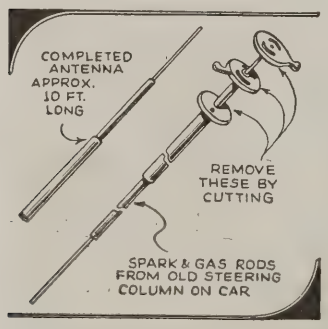
Almost every ham lacking adequate metering tunes his transmitter by means of a wire tuning loop across the ends of which is connected a flashlight bulb. It is hard to judge the brilliance of such a bulb accurately. However, many hams are also photographers and so have exposure meters of the photo cell type. Such meters may be used to take highly accurate



readings of the bulb's brilliance. The distance between the bulb and the meter should be the same at all times but cannot be given here as it will depend upon the size of the bulb used and the sensitivity of the meter. —*R. N. L. "Bob" Forman.*

Telescopic Antenna

A 10-foot telescopic antenna can be made at little or no cost—especially if there is an auto

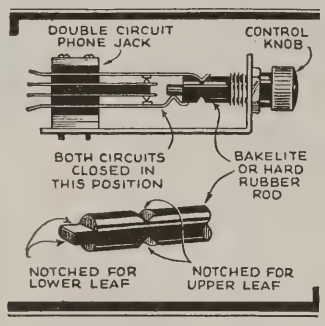


"graveyard" available. Simply take the inside of an old steering column and remove the gas and spark levers. The remaining rods form your telescopic antenna.

I am using four of these for a rotary beam antenna. Not only do they work fine, but they cost me far less than would any similar array.—*Fred Edmunds.*

Double Circuit Switch

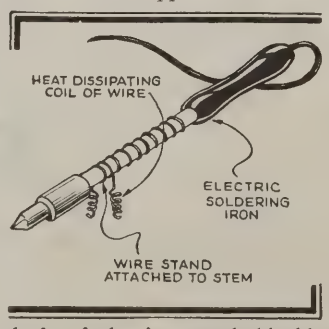
A double circuit rotary switch is easily made from a two-circuit phone jack and a short length of ¼ inch bakelite or


DOUBLE CIRCUIT PHONE JACK
CONTROL KNOB
BOTH CIRCUITS CLOSED IN THIS POSITION
BAKELITE OR HARD RUBBER ROD
NOTCHED FOR LOWER LEAF
NOTCHED FOR UPPER LEAF

hard rubber rod. Deep notches are filed in the end of the rod to fit on the jack prongs as illustrated. These are filed deeper from two diametrically opposed sides so that when the rod is given a quarter turn in one direction, the blades of the jack will come together; and when turned in the other direction will be forced apart. If the rod is made about 1½ inches long, a small knob can be attached to the end.—*Lynn Hetrick.*

Soldering Iron Stand

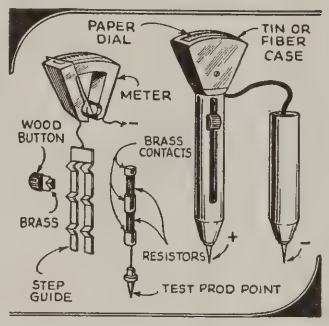
A soldering stand that cannot get lost may sound like magic, but is a gadget that anyone can construct in a few moments. The only material needed is a length of No. 12 bare or enameled copper wire. This is looped once or twice around the iron. The two ends are then coiled into spirals about 2 inches long, so that they will dissipate the heat without conducting it from the iron to the work bench. Another length of wire is wrapped around the



shaft of the iron to hold this stand near the end. Gravity keeps the stand in position.—*Jerry Edgerton.*

Test Prod Meter

A very useful test meter attached directly to the top of a prod can be made by rebuilding an old or new meter. The sizes of the parts are not given in the diagram, as these will depend upon what material one has available. As the drawing shows, the meter needle is bent at right-angles so that with the meter in a vertical position it may still be read from the top. One of the prods is equipped with a group of resistors in order to extend the meter's range and a slider is provided to permit the resistors to be selected at will.



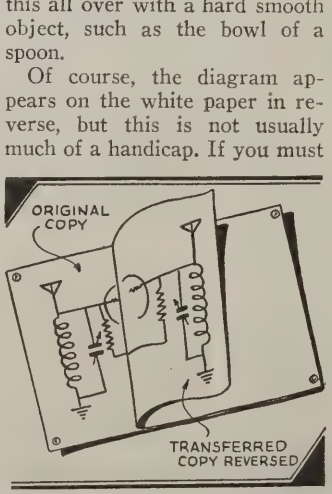
A case of tin or fiber is made to fit the meter employed and a celluloid window is cemented in. —*John Wallace.*

Copying Diagrams

When a large and complicated diagram must be copied, it requires a great deal of time and effort even if one uses tracing paper or carbon paper. Still worse, one is very apt to make mistakes or omissions.

However, after a little experimenting, I have found a much easier, quicker method. I simply apply a little turpentine to a wad of cotton or soft brush and spread it over the entire surface of the diagram. Next, I lay a clean sheet of white paper over the diagram, and finally I rub this all over with a hard smooth object, such as the bowl of a spoon.

Of course, the diagram appears on the white paper in reverse, but this is not usually much of a handicap. If you must

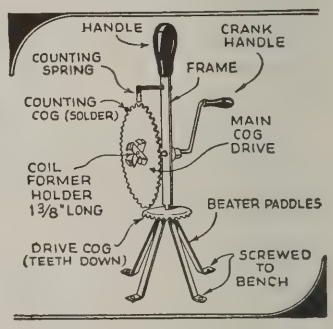


have the diagram appear exactly as the original, simply repeat the process, recopying it from the paper.—*Constantinos Katalas.*

Coil Winder

An excellent coil winding machine is quickly made from an egg-beater of the 10c-store variety. The lower gears and beater blades are removed and the frame is used to mount the remaining portion vertically on the work bench. A four-bladed grip for the coil formers is bent out of spring brass and soldered or bolted directly to the large wheel, which is fastened to the crank handle. These grip blades should be at least 1 to 1½ inches long and ½ inch wide, and spaced to take whatever diameter coil form is being used.

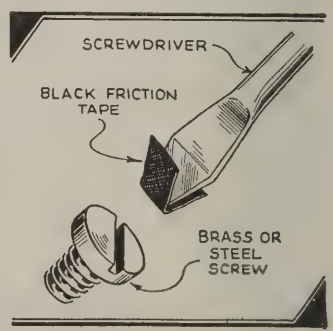
To make it easier to count the turns, a piece of solder is sweated onto one of the teeth of the wheel and a piece of clock spring is mounted on the frame in such a way that the solder strikes it, so that a click is heard on each revolution.



A good strong way of mounting this coil winder is had by reversing the driven gear and replacing it with the beater blades, as shown in the sketch.—*Ronald Williamson.*

Screw Holder

This gadget, which I have been using for years, enables a screwdriver to cling to brass screws as well as steel ones. It is the simplest trick—and yet one of the most useful—that I have ever encountered, for it consists



only of a small piece of black friction tape put over the end of any screwdriver. When the screwdriver is pressed into the head of the screw, the tape wedges into the slot tightly enough so that the screw may be guided into or out of a hole. —*William Greenbaum.*

What Do YOU Think?

Built Our Sets—Worked OK. 100%

Editor,

I have been a reader of RADIO & TELEVISION since 1932, when it was then called *Short Wave Craft*. That was a very good name for the magazine and it stuck for a good many years. Then when Television began to be publicized as "just around the corner" and the radio public in general began to sit up and take notice of its possibilities, RADIO & TELEVISION was chosen as the appropriate name for the magazine.

I think you have really got something now. You have a name that will stick for a number of years to come. Congratulations for your fine choice.

Television is not just around the corner any longer; it is turning the corner and all that is needed is a few more years of experimentation and a source of publicity such as RADIO & TELEVISION to put it across. Also short waves and other radio waves are not considered so far apart as they once were, so all in all I say once more RADIO & TELEVISION is the best possible name you could have chosen for your FB magazine.

I have built a number of sets and other apparatus using the circuits described and they all worked 100%. Much good and timely information has been obtained from the columns of your swell magazine, which I was unable to get elsewhere.

I have also made several very good friends throughout the world by exchanging cards and correspondence with fellow radio enthusiasts, whose names and addresses I have obtained from RADIO & TELEVISION and I hope to make many more. I am always glad to exchange cards and correspondence with Hams, SWL's and others interested in radio.

Well I shall close now by again thanking you for your most helpful magazine, which I consider to be the best on the market for both beginners and advanced radio enthusiasts.

JOHN P. BAKER,
1637 Woodward Ave.,
Springfield, Ohio

He Prefers His Photo Magazine Separate

Editor,

I have received December issue of RADIO & TELEVISION incorporating FOTO-CRAFT.

Frankly, I am not one bit pleased with this set-up. Although I do part-time service work and have played with radio since 1927, and while a great deal of my knowledge of radio has come through the medium of some of your publications, I prefer to have my radio and photography magazines distinct and separate.

I am sure that those who have subscribed for your RADIO & TELEVISION magazine have the same opinion regarding photography being mixed up with their pet hobby.

Also the format of the present magazine is not as convenient as the previous ones.

HOBART I. HALL,
1661 Thirteenth Avenue,
Huntington, West Va.

This Ham Likes to Hear from SWLs

I think RADIO & TELEVISION is one of the best magazines that can be bought. As I am a Ham, I like all the dope on Ham radio and I think the Ham articles are the berries.

As to George Mathews' letter in a recent issue, he does not have any kick coming about sending 135 SWL cards and getting back only 40. I have been on the air for over 8 years and find that only about half of the Hams will answer my card, even after they promise to QSL. They want your card pretty badly when they send their QTH a dozen times to make sure you have it right. Then you send them a card but don't get any back. I like to get QSLs and I answer every card I get from any SWL or Ham.

Wm. Gordon's (W2KSL) letter was F.B. He wrote that SWLs who would be future Hams should listen on the CW bands. At the same time they can get QSL cards and be learning the code. I sure would like to have some of these DX SWLs send me a SWL if they hear me. I will answer all cards. In the past 15 months I have QSO'd 40 Hams in Australia, but so far I haven't got a QSL from there yet. I sent cards to the first five I worked, never got any back, so I never sent any more. But if I get any, I will answer. Also sent several cards to New Zealand, but none answered. I was wondering if I really did work Australia and New Zealand, or what?

So a lot of luck to your FB magazine.

George Kucsera, W8FEO,
P. O. Box 254,
Rivesville, W. Va.

R&T Helped Him Get License

Editor,

I use a 45 TPTG transmitter and a 2-tube receiver (described in R & T). I have worked all districts except W1 on 80 meter CW since spring. I read R&T and it sure helped me on to my "ticket". Congratulations on the F.B. magazine. Would like to hear from SWL's and Hams.

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FREE! See your nearest RCA Transmitting Tube jobber for your copy of November 1939 "Ham Tips" containing diagrams and complete construction data on this remarkable new lay-out—also the October 1939 issue containing additional applications showing the results obtainable with these record-breaking new RCA-811's and RCA-812's. If your jobber cannot supply you, copies may be obtained free from the Commercial Engineering Section, RCA Mfg. Co., Inc., Harrison, New Jersey. Don't miss them!
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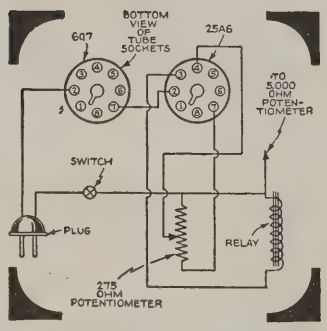
Radio Tubes
FIRST IN METAL—FOREMOST IN GLASS—FINEST IN PERFORMANCE

Question Box

Capacity Relay Hook-up

In studying the diagram given in the September issue of Radio & Television, *page 277, for the A.C.-D.C. Capacity Relay, I fail to understand just how this can work.—H. E. Binning, Detroit, Mich.*

A Corrected diagram for the proper connection of the A.C.-D.C. Capacity Relay is given herewith. A fairly sensitive relay, having not less than 1,000 ohms resistance, should be used with this circuit.



Correct diagram for capacity operated relay. No. 1207.

Query on the "Bauer" T. R. F. Four

Please give me more information regarding the impedance coil to be connected at point X in the circuit diagram of the Bauer T.R.F. Four, described in the May issue.—Wm. C. Scott, Cincinnati, Ohio.

A. If the builder is of an experimental turn of mind and would like to improve the performance of this remarkable little receiver on distant stations, he can insert an impedance at point "X" on the diagram. This is nothing more than a coil shunted by a variable condenser so that the screen circuit of the R.F. tube can be tuned over the B.C. band.

If the impedance at "X" is tuned to the same frequency as the receiver, the effect is the same as if the screen had been removed from the 6K7 without disturbing the other elements. This affords feedback in the good old Armstrong tuned-grid-tuned-plate manner. Actually in practice the screen circuit is never tuned to resonance because it results in oscillation and complete blocking of the R.F. amplifier.

This tuned regeneration control seems to work best when tuned to a frequency somewhat higher than the signal frequency. Trial will readily determine the best setting of the regeneration condenser for any given signal frequency. This controlled regeneration with a stable amplifier is capable of some surprising results. If it is desired to use the sensitivity control only when fishing for DX, the regeneration condenser can be set at minimum capacity and forgotten.

The circuit developed in this article is really what is known as a *band pass amplifier.* However, in this receiver, the coupling is purposely adjusted below the critical value. If more than one stage of R.F. is used, the coupling may be tightened, and the result is a remarkable high-gain, high-fidelity band-pass amplifier either for P.A. (public address) work or for use in the home of the discriminating user.

Trouble With "Parlor" Transmitter

I built the Parlor Radio Transmitter described by H. G. McEntee in the September, 1939, issue and it works perfectly except for one thing. Whenever I get within a foot of, or touch, the set or microphone, the frequency shifts and a lot of squeals and howls come through the receiver tuned in with it.

I am using a cigar box lined with lead foil, with ground leads grounded directly to the foil. An external mike, 22½ volts of "B" battery, a Thordarson transceiver audio with an S.B. mike winding; the audio leads are left floating. The specified Meissner coil only shielded instead of unshielded. I use a type 230 tube.

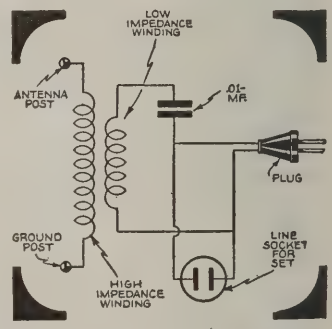
When I use a phonograph to furnish sound to the mike, the quality is good and the frequency stable. A shielded mike cable (crystal mike cable) does no good. Also an R.F. choke in the plate lead does not help.—Arthur J. Massara, Albany, N. Y.

A. The only suggestion we can offer is that you try enclosing the mike in the shielded box, or at least fastening it to the outside without the long connecting leads. Your changes in the parts used should make no difference. Also, be sure to pick a working frequency which is entirely free from broadcast stations, either local or distant.

It might help to use a 45 volt "B" battery, as was used in the original; this would produce a stronger signal and might offer more freedom from hand capacity.

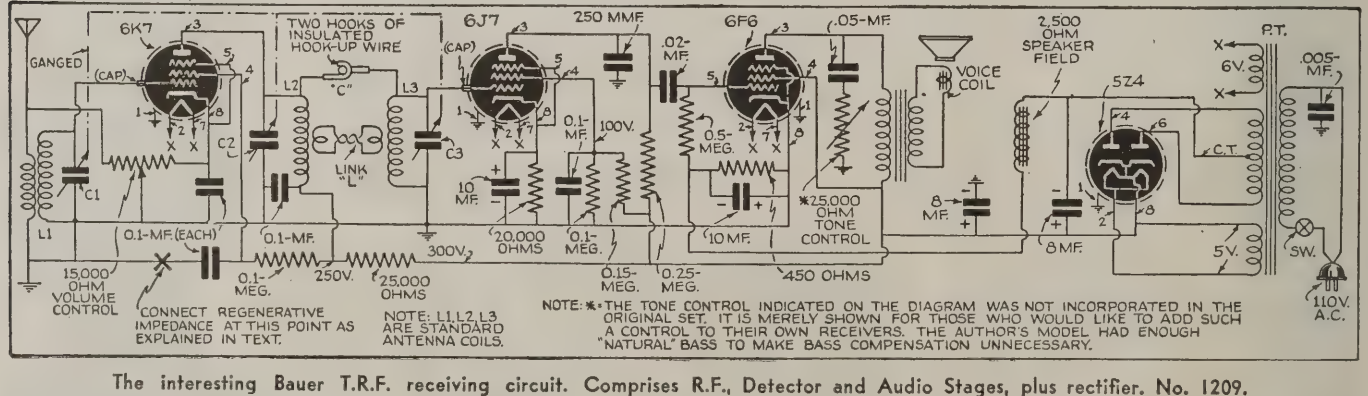
Wizard Antenna

In the new 1940 line of receivers, a few manufacturers are incorporating the antenna system in such a manner that increased signal strength is obtained when used in connection with the socket of the A.C. circuit that supplies the radio receiver. Can a diagram be shown how this is accomplished?—P. L. Waska, Onalaska, Wisconsin.



"Built-in" antenna system using the 110 volt A.C. line. No. 1208.

A. Such a diagram is shown here. It shows the "works" of the Stromberg-Carlson Wave Wizard antenna. It operates on the R.F. signal present in the power line, the device consisting of a step-up R.F. transformer to match the impedance of the line to the antenna circuit of the receiver. The transformer is composed of two windings, the primary of which is connected directly across the power line through a .01 mf. condenser, which is inductively coupled to the secondary. The ratio of the two windings is such that a voltage gain takes place and an increased signal voltage reaches the antenna post.



The interesting Bauer T.R.F. receiving circuit. Comprises R.F., Detector and Audio Stages, plus rectifier. No. 1209.

Let's Listen In with Joe Miller

● STILL being faced with a dearth of really important DX news, we are, however, carrying on with the ol' column, with hopes that the present chaotic conditions throughout the world may some time soon (as we fervently hope, with many others) calm down to a state more like our so-called civilization.

It would seem, what with most of the amateurs ordinarily heard now off the air, that many DXers have lost their usual interest in combing the dials, but we feel that this makes all the more possible their opportunity to log the more difficult DX broadcasters, and those commercial phones mentioned last month. A DXer who ordinarily would not dare tune off the ham bands to try for these stations for fear of missing a good amateur catch can now do so, knowing full well that little, these days, is likely to be missed on the usually jammed ham bands.

Therefore, it is advised that DXers should really try for these other stations, especially now, in mid-winter, when the DX broadcasters are especially well heard, with the quietest season of the year now here, and for the commercials, busier than ever with the increasing need for communication necessitated by present conditions.

Thus, we advise all of you OMs to make out a list of all the better DX broadcasters, making a schedule for each hour of the day, as we have, and keep plugging. Here's to DX news at hand:

NEPAL

A station announcing as "Radio Katmandu" was heard at 10 p.m. on 14.78 mc., operating in the little known land called Nepal, which is situated between northern India and southern Tibet. The program was composed of native music, oriental in character, and reports were requested (Wokaty—I.D.A.).

PHILIPPINE ISLANDS

KZRH, 9.635 and 6.10 mc., Manila, announcing as "the voice of the Philippines," is now on 5-11 a.m. weekdays, and 2:30-11 a.m. on Suns. KZRH uses a 3 tone chime signal, with English announcements; heard very well on eastern coast on 9.635 mc. KZIB, on 9.492 and 6.04 mc., Manila, is heard from 6:30-10 a.m., with NBC chimes every half-hour. QRA: P. O. Box 440, power 1 kw. KZEG, 6.14 mc., called "Radio Filipino," also at Manila, is used daily in parallel with KZRM on 9.57 mc.

JAVA

PMH, 6.727 mc., Bandoeng, is going to be well heard this winter, now being well received on their 4:30-11 a.m. schedule, with best sig. 6-7 a.m. YDB, 15.31 mc., Soerabaja, on 10:30 p.m.-2 a.m., Sats. 7:30 p.m.-2 a.m., is a good catch; best heard here on East Coast near 1-2 a.m. YDC, 15.15 mc., very well heard on daily schedule of 4:30-10:30 a.m., best 6-7:30 a.m.

PMY, 5.14 mc., also at Bandoeng, is a real test for eastern DXers, but should now be well received, already heard here, best 5:30-7 a.m., on its schedule of 5 a.m.-noon. YDD, 6.06 mc., Bandoeng, should be tried for near 6-7 a.m., on a daily schedule of 5:30 a.m.-noon. YDX, Medan, Sumatra, on 7.22 mc., is really a catch, being in the 40 meter ham band, and will best be heard in the beginning of their 6-10:30 a.m. schedule. YDB, Soerabaja, also on 9.55 mc., is a fine signal from 6-7 a.m. (approx.), on their best schedule of 4:30-10:30 a.m. PMN, 10.26 mc., Bandoeng, is about the easiest Javanese sig. to "bet on," coming in all clear on this freq. from 4:30 a.m. on, with schedule ending at 11:30 a.m.

QRAs for PMH, YDB, YDC, YDD are: NIROM, Batavia, Java, and for PMY, Nillony Building, Bandoeng. For YDX, NIROM, Medan, Sumatra, Java.

IRAQ

At Baghdad, the new 5 kw. govt. transmitter has been assigned the following calls and frequencies: HNI, 17.815; HNH, 15.145; HNG, 11.724; HNF, 9.683; HNE, 6.188 mc. At present, HNF is known to be operating on a schedule of 6 a.m.-3 p.m. As we have heard HNF near the end of their schedule, 3 p.m., we believe this is the best time to try for HNF for East Coast tuners. For the West Coast, it is believed that it would be preferable to try near 6 a.m., or a little later, as that would be 3 a.m. there (NNRC-I.D.A.).

THAI

HSPP, 6.15 mc., Bangkok, is being heard in parallel with HS8PJ, on 9.51 mc. HSP, 17.74 mc., the commercial phone at Bangkok, at the end of the 16 meter broadcast band, is a nice catch for any DXer, and should be kept after, as it often operates in early a.m.'s, best bet from 5:30-7 a.m. Identified by the usual Asiatic "flutter," and by the use of inverted speech, though we have at times heard HSP in clear speech. QRA for HSP: Supt. Engineer of Radio, Post & Telegraph Dept., Bangkok, Thai. We have already had verified 3 commercials at Bangkok, namely, HSP, HSE, 10.06 mc., and HSE2, 19.016 mc. These 2 latter stations should be watched, especially in early a.m.'s, as HSE was logged at 5:30 a.m. and HSE2 at 9:10 a.m. These stations usually called Berlin in clear speech, then switched to inverted speech. All have that Asiatic "flutter." A last note about still another Bangkok phone concerns HSP5, 8.11 mc., which has never been reported heard.

BURMA

XYZ, 6.007 mc., Rangoon, operating from 6.30-10 a.m., was fairly well heard on occasions last year in January, and should be a really FB catch to try for in the way of DX. Picture of QSL shown in July, 1939, article, with QRA given on card. Best bet at the beginning of BC. VVS, 12.87 mc., at Mingaladon, phones VVN, 13.35 mc., at Madras, India, near 7 a.m. at least once a week,

(Continued on page 601)

EVERY receiving problem confronting the amateur and short wave listener was carefully analyzed during the design of the "HQ-120-X". Three very important features were the result of this analysis. Variable crystal filter selectivity for phone, as well as CW reception, has had the effect of more than doubling the width of the amateur and short wave bands. This high degree of selectivity cuts down background noise and hiss as well as QRM. The next important feature is the calibrated bandspread dials, making it easy to spot stations with remarkable accuracy. The third feature is the antenna compensator. With this control, peak efficiency is assured at all times, even with the simplest form of antenna. Your local Hammarlund dealer will be pleased to demonstrate these as well as other outstanding features of the "HQ-120-X".

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This series of dials (Nos. D-1732 to D-1735) represents the ULTIMATE in handsome tuning controls. Plates have a spun chromium finish and are attached to a fluted bakelite knob. Supplied with single line indicator—vernier indicator available. Very reasonable in price.

Your local BUD jobber has them!

BUD RADIO, INC.

5205 Cedar Ave. Cleveland, Ohio

World Short Wave Stations

Revised Monthly

Complete List of SW Broadcast Stations

Reports on station changes are appreciated.

Mc.	Call	
42.020	VK2MA	SYDNEY, AUSTRALIA., 7.14 m. Addr. Amal. Wireless Ltd., 47 York St. Daily 1-7 am.
31.600	W1XKA	BOSTON, MASS., 9.494 m., Addr. Westinghouse Co. Daily 6 am.-1 am., Sun. 8 am.-1 am. Relays WBZ.
31.600	W1XKB	SPRINGFIELD, MASS., 9.494 m., Addr. Westinghouse Co. Daily 6 am.-1 am., Sun. 8 am.-1 am. Relays WBZ.
31.600	W3XEY	BALTIMORE, MD., 9.494 m., Relays WFBR 4 pm-12 m.
31.600	W2XDV	NEW YORK CITY, 9.494 m., Addr. Col. Broad. System, 485 Madison Ave. Daily 6-11 pm.; Sat. and Sun. 1.30-6, 7-10 pm.
31.600	W9XHW	MINNEAPOLIS, MINN., 9.494 m. Relays WCCO 9 am.-12:30 am.
31.600	W3XKA	PHILADELPHIA, PA., 9.494 m., Addr. NBC. Relays KYW 9 am.-10 pm.
31.600	W5XAU	OKLAHOMA CITY, 9.494 m., Sun. 12 n-1 pm., 6-7 pm. Irregular other times.
31.600	W9XUY	OMAHA, NEBR., 9.494 m. No sked. known.
31.600	W4XCA	MEMPHIS, TENN., 9.494 m. Addr. Memphis Commercial Appeal. Relays WMC. 10 am.-6 pm.
31.600	W8XAI	ROCHESTER, N. Y., 9.494 m., Addr. Stromberg Carlson Co. Relays WHAM 7.30-12.05 am.
31.600	W8XWJ	DETROIT, MICH., 9.494 m., Addr. Evening News Ass'n. Relays WWJ 5 am.-11.30 pm. Sun. 7 am.-11 pm.
31.600	W5XD	DALLAS, TEXAS, 9.494 m., 11.30 am.-1.30 pm. Ex. Sat.-Sun.
26.500	W2XQO	NEW YORK CITY, N. Y. 11.32 m. Noon-9 pm.
26.500	W9XTA	HARRISBURG, ILL., 11.32 m. 1-4 pm.
26.400	W9XAZ	MILWAUKEE, WIS., 11.36 m., Addr. The Journal Co. Relays WTMJ from 1 pm. to midnite.
26.150	W4XA	NASHVILLE, TENN., 11.47 m., noon-10 pm.
26.150	W9XUP	ST. PAUL, MINN. 11.47 m. Rel. KSTP 8 am.-1 am.
26.100	W9XJL	SUPERIOR, WIS., 11.49 m. Relays WEBC daily. 9 am.-5 pm.
26.050	W9XTC	MINNEAPOLIS, MINN., 11.51 m. Relays WCTN 10 am.-8 pm.
26.050	W9XH	SOUTH BEND, IND., 11.51 m. Addr. South Bend Tribune. Relays WSBT-WFAM 2.30-6.30 pm., exc. Sat. and Sun.
26.000	W8XUJ	CINCINNATI, OHIO. 11.54 m. 2-3 pm.
26.000	W9XA	KANSAS CITY, MO., 11.54 m., Addr. Commercial Radio Eqpt. Co. 10 am.-1 pm., 3-7 pm.
25.950	W6XKG	LOS ANGELES, CAL., 11.56 m., Addr. B. S. McGlashan, Wash. Blvd. at Oak St. Relays KGFJ 24 hours daily. DX tips Mon., Wed. and Fri. 2.15 pm. Temp. off air.
25.950	W8XNU	CINCINNATI, OHIO, 11.56 m., 7 am.-2, 3 pm.-1 am. Sun. 8 am.-2, 3 pm.-1 am.
25.900	W9XPD	ST. LOUIS, MO., 11.6 m. Addr. Pulitzer Pub. Co. Relays KSD. 3-5:15 p.m.
25.300	W9XOK	ST. LOUIS, MO., 11.86 m. Addr. St. Louis Times-Star, Relays KXOK.
25.300	W2XJI	NEW YORK, N. Y. 11.86 m., Addr. Bamberger Broad. Service, 1440 Broadway. Relays WOR 12 n.-6 pm.
25.250	W2XUP	NEW YORK CITY. 11.88 m. 4-5 pm.
21.640	GRZ	DAVENTRY, ENG., 13.86 m. Addr. B.B.C., London. Unused at present.
21.630	WRCA	BOUND BROOK, N. J. 13.87 m. Addr. N.B.C., N. Y. C. Noon-3.30 pm. to Europe.
21.570	WCBX	NEW YORK CITY, 13.91 m. Addr. CBS, 485 Madison Ave. 8 am.-12.30 pm. to Europe.
21.565	DJJ	BERLIN, GERMANY, 13.92 m., Addr. Broadcasting House. Irreg.
21.550	GST	DAVENTRY, ENG., 13.92 m., Addr. (B.B.C., London) 5.42-10.15 am.
21.540	WPIT	PITTSBURGH, PA., 13.93 m., Addr. Grant Bldg. Relays KDKA 6.30-8 am.
21.530	GSJ	DAVENTRY, ENG., 13.93 m., Addr. (See 21.550 mc.) 5.40-8.45, 9.30-11.45 am.
21.520	WCAB	PHILA., PA., 13.94 m., Addr. Col. Broad. Syst., 485 Madison Ave., N. Y. C. 12 n. to 3.45 pm. Sat. 12 n.-6 pm. Sun. 12 n.-2.30 pm. to So. Am.
21.510	2RO16	ROME, ITALY. 13.94 m. 9-9.55 am., irregularly.
21.500	WGEA	SCHENECTADY, N. Y., 13.95 m., General Electric Co., 8-11 am.
21.480	PHI3	HUIZEN, HOLLAND, 13.96 m. Addr. N. V. Philips, Hilversum. Irregular, 6.10-9.35 am.
21.470	GSH	DAVENTRY, ENG., 13.97 m. 5.40-8.45 am. to Africa.
21.460	WRUL	BOSTON, MASS., 13.98 m. Addr. University Club. 10-11 am. except Sat. and Sun. to Europe.
21.450	DJS	BERLIN, GERMANY, 13.99 m., Addr., Broadcasting House. 12.05-7.55 am. To Asia.
19.020	HS6PJ	BANGKOK, THAI, 15.77 m. Mondays 8-10 am. See 15.23 mc.
18.450	HBF	GENEVA, SWITZERLAND, 16.26 m., Addr. Radio Nations. Fri. 8.45-10.45 am.
18.040	KHE	KAHUKU, HAWAII. 16.63 m. Sats. 8.30-9 pm.

16 Met. Broadcast Band

17.850	TPB3	PARIS, FRANCE, 16.8 m. Addr. (See 15.245 mc.) 5-10 am.
17.845	DJH	BERLIN, GERMANY, 16.81 m., 12.05-7.50, 8-11 am.
17.840	HVJ	VATICAN CITY, 16.82 m. Heard 12 n. on Wednesday.
17.840	EIRE	MOYDRUM, ATHLONE, EIRE, 16.82 m. Addr. Radio Eireann. 8.30-10 am.; Even dates 12.30-2.30 pm., 5.30-6 pm.; Odd dates 12.30-2.30 pm.
17.830	LRA5	BUENOS AIRES, ARG. Fri., 4-4.30 pm.
17.830	WCBX	NEW YORK CITY, 16.81 m. Addr. CBS, 485 Madison Ave., N. Y. C. 8 am.-6 pm. Irregular.
17.820	2RO8	ROME, ITALY. 16.84 m., Addr. (See 2RO, 11.81 mc.) 5-7.25, 7.30-9 am., 6-7.25 pm. to So. Am.
17.810	GSV	DAVENTRY, ENGLAND, 16.84 m., 7-11.45 am. to N.A, 11.52 am.-3.30 pm. to Africa. News, 8.15, 11 am. to Far East.
17.800	OIH	LAHTI, FINLAND, 16.85 meters, 4-9 am.
17.790	GSG	DAVENTRY, ENG., 16.86 m., Addr. B.B.C., London. 5.40-10.15 am. to Australia and W. I.
17.785	JZL	TOKYO, JAPAN, 16.86 m. Irregular.
17.780	WNBI	BOUND BROOK, N. J., 16.87 m., Addr. Natl. Broad. Co., 9 am.-4 pm. to Europe, 4-11 pm. to So. Amer.
17.770	PHI2	HUIZEN, HOLLAND, 16.88 m., Addr. (See PHI, 11.730 mc.) Daily 7.40-8.45 am. Mon. & Thurs. 7.40-9 am. Sun. 6.40-10.05 am.
17.760	DJE	BERLIN, GERMANY, 16.89 m., Addr. Broadcasting House. 12.05-7.45, 8-11 am., 4.50-9 pm. Also Sun. 11.10 am.-12.25 pm.
17.755	ZBW5	HONGKONG, CHINA, 16.9 m., Addr. P.O. Box 200. Dly. 11.30 pm.-1.15 am., 5-10 am., Sat. 9 pm.-1.30 am., Sun. 5-9.30 am. Operates irreg.

End of Broadcast Band

17.310	W2XGB	HICKSVILLE, L. I., N. Y., 17.33 m., Addr. Press Wireless, Box 296. Tests 9.30-11.30 am. except Sat. and Sun.
17.280	FZE8	DJIBOUTI, FRENCH SOMALILAND, 17.36 m. Test XMSN 1st Thurs. each month 8-8.30 am.
15.550	CO9XX	TUINICU, ORIENTE, CUBA, 19.29 m., Addr. Frank Jones, Central Tuinicu, Tuinicu, Santa Clara. Broadcasts irregularly evenings.
15.410	RV96	MOSCOW, U.S.S.R. 19.47 m., 5-7.30 am., 8.55-10.30 pm.
15.370	HAS3	BUDAPEST, HUNGARY, 19.52 m., Addr. Radiolabor, Gyali Ut 22. Sun. 9-10 am.
15.360	—	BERNE, SWITZERLAND, 19.53 m. Irreg. 6.45-7.45 pm.
15.360	DZG	ZEESEN, GERMANY, 19.53 m., Addr. Reichspostzenstralamt. Tests irregularly. Ams.
15.350	—	LUXEMBURG (no call). 19.54 m., 7 pm.-3 am. approx.

19 Met. Broadcast Band

15.340	DJR	BERLIN, GERMANY, 19.56 m., Addr. Br'dcast'g House, 4.55-10.50 pm. to C.A.
15.330	KGEI	SAN FRANCISCO, CALIF., 19.56 m. Addr. General Electric Co., 6.30-11.15 pm. to So. America.
15.330	WGEA	SCHENECTADY, N. Y., 19.56 m., Addr. General Electric Co. Relays WGY, 8 am.-6 pm. to Europe.
15.325	JLT3	TOKYO, JAPAN, 19.58 m. 9-10.30 pm.
15.320	OZH	SKAMLEBAK, DENMARK, 19.58 m., Sun. 8 am.-1.30 pm. Dly. 1-1.30 pm.
15.310	GSP	DAVENTRY, ENG., 19.6 m., Addr. (See 17.79 mc.) 2-5 am. to Near East, 1.35-3.30 pm. News 2 pm. to No. Am.
15.310	YDB	SOERABAJA, JAVA, N. E. I. 19.60 m. Addr. NIROM. 10.30 pm.-2 am., Sat. 7.30 pm.-2 am.
15.300	2RO6	ROME, ITALY. 19.61 m., Addr. (See 2RO, 11.81 mc.) 4.10-4.55 am.; 10 am.-12.06 pm.; 1.40-2.30; 3-5.30 pm.; 7-9.30 pm. to N.A.
15.300	XEBM	MAZATLAN, SIN., MEX., 19.61 m., Addr. Box 78, "El Pregonero del Pacifico." Irregularly 9-10 am., 1-2, 8-10 pm.
15.290	VUD2	DELHI, INDIA, 19.62 m. Addr. All India Radio, 9.30-11.30 pm., 1.30-3.30 am., 7.30 am.-12.30 pm.
15.290	LRU	BUENOS AIRES, ARG., 19.62 m., Addr. El Mundo. Relays LRI, 7-9 am.
15.280	DJQ	BERLIN, GERMANY, 19.63 m., Addr. Broadcasting House. 12.05-11 am., 4.50-10.50 pm.
15.270	WCBX	NEW YORK CITY, 19.63 m., Addr. (See 21.570 mc.) Daily exc. Sat. and Sun. 1-3.30 pm., Sun. 1-2.30 pm. to Europe.

(Continued on page 615)

All Schedules Eastern Standard Time

I Cover the Pacific Coast!

(All times are P.S.T.)

Lyle M. Nelson

● TOP reception from all parts of the world on the 25, 31 and 49 meter bands has been reported by Pacific Coast listeners during the past month. In addition to the regular nightly programs from South and Central America, many Asiatic stations are coming through during the early morning hours.

The mysterious Oriental reported broadcasting on 14.78 mcs. near 9:30 p.m. and 4 a.m. is believed to be located in Katmandu, Nepal, by Mr. Kendall Walker of Yamhill. Mr. Walker writes that the station is very weak but occasionally an announcement which sounds like "Radio Katmandu" is heard.

The popular Japanese "overseas program," for years a favorite here on the Pacific Coast, has been shifted from JZK, 15.16 mcs., to a winter frequency of 11.80 and station JZJ. The program continues to be heard here from 9 to 10:30 p.m.

Several listeners including Mr. Walker are reporting good reception from JZI, 9.54 mcs., during the broadcasts for Asia from 4 to 6:30 p.m. JZK on 15.16 mcs., is occasionally heard here from 5 to 6 p.m.

Reports from Australia indicate that all Amalgamated Wireless stations, including VK2ME, VK6ME, VK3ME and VPD now are off the air and will be down until the end of the war. VLR on 9.58 still is reported by several listeners during the early morning hours.

Uruguay's CXA6 on 9.63 mcs. has greatly increased in signal strength and can now be tuned almost any time from 4 to "signoff" at 6:30 p.m. Announcements in English are given at every half hour.

Mr. John Cavanagh of Oregon City reports excellent reception from CSW7 of Lisbon, Portugal. CSW7 can be heard with the English transmission for North America daily from 5 to 6 p.m. on 9.47 mcs., he says. Reception is excellent.

Several listeners have reported the North American program from Sweden on Wednesdays and Saturdays from 5 to 6 p.m. over SBT on 15.16 mcs. SBT comes in well here with best reception towards the end of the broadcast.

Once in a while some short wave station considered practically impossible to tune here is picked up. Such was the case recently when South Africa's ZRL on 9.61 mcs. came booming through. For almost a week this station was audible from 8:45 to 11:50 p.m. daily except Saturday with best reception near 10 o'clock.

The German programs are reaching here with good volume at present over stations DJB, 15.20; DJL, 15.11; DJD, 11.77; and DXB, 9.61 mcs. The following schedule for North America has been announced: 3:30 to 6 a.m. on DJB, 1:50 to 5 p.m. on DJL, and 5 to 7:55 p.m. on DJD. DXB is on the air from 1:50 to 7:50 but is not usually heard here until after 5 p.m.

A new Mexican station, XEQQ, is operating on 9.69 mcs. nightly until 10 p.m. The address, according to announcement, is: "Radio Panamericana," Apartado 950, Mexico, D.F.

One of the most powerful stations in the early mornings has been KZRH of Manila. KZRH operates from 3 to 8:30 a.m. and is well received here throughout the entire broadcast.

ROUND 'N' ABOUT—From listeners' reports: CSW5 of Lisbon heard here Sunday mornings near 7 on 11.04 mcs. . . . . New Costa Rica station is excellent from 6 to 8 p.m. daily on 5.83 mcs. . . . . Chile's CB1180 broadcasts a special program for North America from 7 to 7:30 pm. daily . . . . Government of Spain soon to have new transmitters on the air . . . . COCQ of Havana continues to shift frequency. Now is heard on 8.82 and 6.40 mcs. . . . . HP5A on 11.70 signs off with English announcement at 7 p.m. Occasionally stays on the air later . . . . XGOY on 11.90 mcs. in Szechuan puts forth an excellent signal during early morning hours . . . . Station heard on 8.20 mcs. relaying PSH from 3 to 4 p.m. daily . . . . LRI, 9.69 and LR2, 6.18 mcs., in Buenos Aires are heard with fair volume until "signoff" at 6 p.m. daily . . . . The 62-meter band is becoming active with Spanish speaking stations during the early evenings . . . . In spite of reports that all Colombian stations have shifted to this band many are still being reported on 31 and 49 meters . . . . ZBW3 on 9.52 in early morning hours . . . . RNE on 12.00 mcs. is heard here as late as 10 p.m. irregularly . . . . New Mexican XEKW reported on 6.04 mcs. until 9 p.m. . . . . Both HP5J of Panama City and XEYU of Mexico City are trying to hold down the 9.59 megacycle spot on the dial and neither is getting anywhere . . . . COCH also on 6.46 mcs. until 9 p.m. daily.

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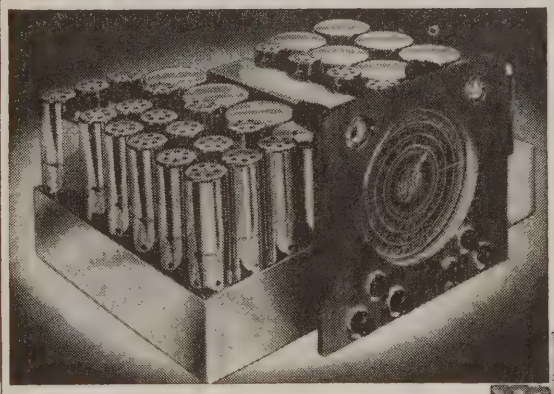
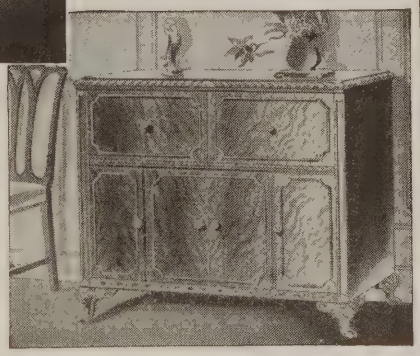


Above: Gleaming chromium plated Tuning Chassis of Scott Philharmonic, built with fine watch precision.

Below: New Scott Chippendale Cabinet, with special acoustical properties, for radio and record player.



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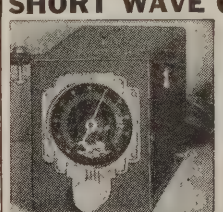
SHORT WAVE CONVERTERS for CAR RADIOS



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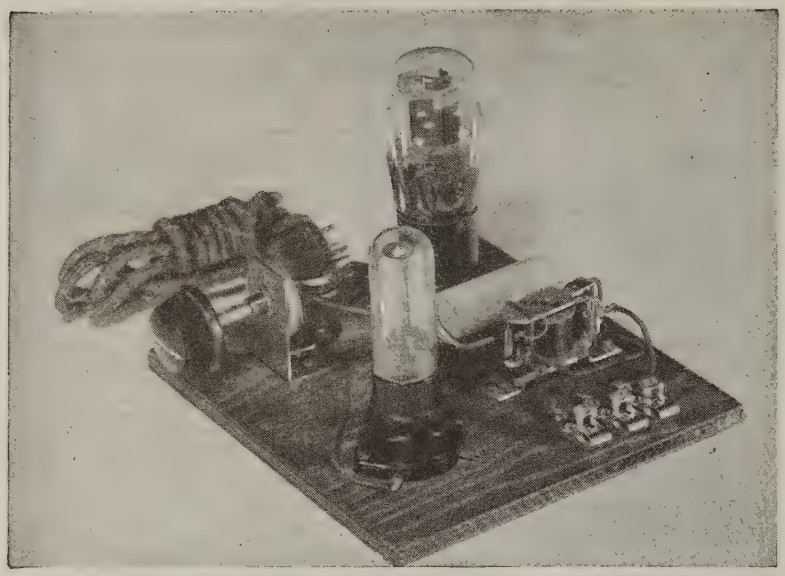
Simplified Photo-Cell Units

M. M. Beitman



Left — Complete photo-cell unit.
Below — A & B — Schematic and picture diagrams for 110 V., A.C. - D.C. hook-up. C & D — Battery hook-ups.

● EVERY day new applications are found for *photo-cell* equipment. Many are familiar with the mysterious swinging doors, automatic drinking fountains, and animated window displays which such cells operate. In industry, too, photo-cell equipment has found hundreds of uses and is now considered an indispensable tool. For the task of counting, sorting, and checking, no other piece of equipment nor any human being can offer any competition to the efficiency and accuracy of photo-cell methods. The matching of colors has been greatly simplified, and high-speed counting has been made possible with this "electric eye."

The unit illustrated can be built for around $6.00, including photo-tube, is self-powered, and may be operated from 110 volts A.C. or D.C.; the absolute minimum of inexpensive parts is used; and the breadboard layout simplifies the mounting and wiring.

A type 43 tube serves as the rectifier and amplifier. The constant bias on the control grid will depend on the amount of light and must be adjusted to a sensitive point by means of the 1,500-ohm potentiometer. When connected to a source of A.C. power, the unit operates one-half of the time and the 8 mf. electrolytic condenser across the relay serves to eliminate chatter.

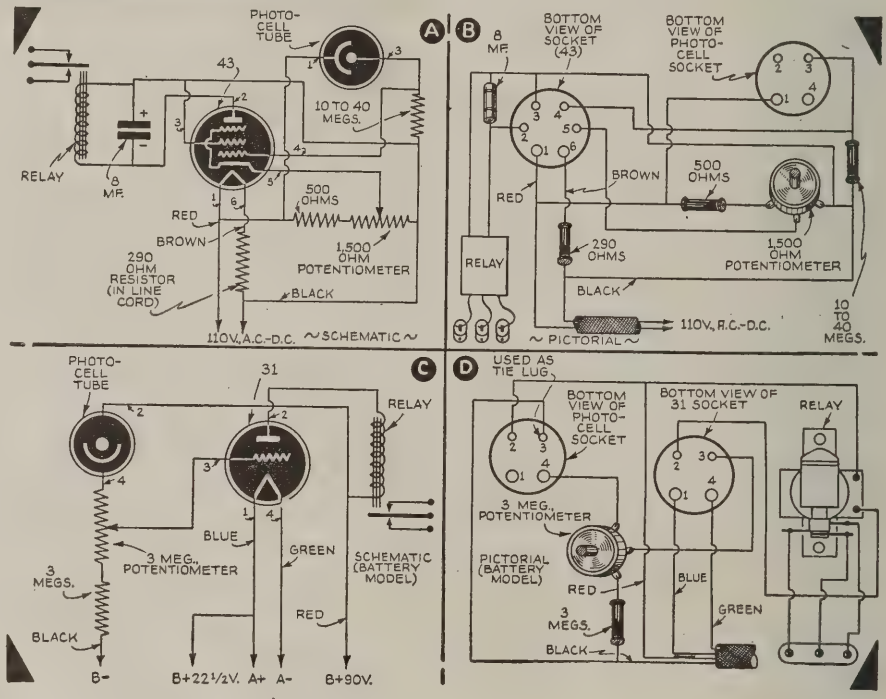
Consider the circuit at the point where a positive potential exists on the side of the line connected to the relay and screen grid of the type 43 tube. If the control grid of this tube is not biased to a cut-off point, a certain amount of energy will pass through the plate circuit and activate the relay. The actual bias on the grid will depend on the internal resistance of the photo-tube, and on the setting of the potentiometer.

With the photo-cell receiving a definite amount of light, the potentiometer may be adjusted so that the plate current is just below the point where the relay will have sufficient energy to pull down the armature. Now, if the source of light is reduced, the internal resistance of the photo-tube will rise and cause a higher positive potential to be applied to the grid and counteract the negative potential obtained through the drop in the potentiometer circuit. The net rise of the control grid voltage will cause additional plate current to pass and the armature of the relay to move down to the magnet pole.

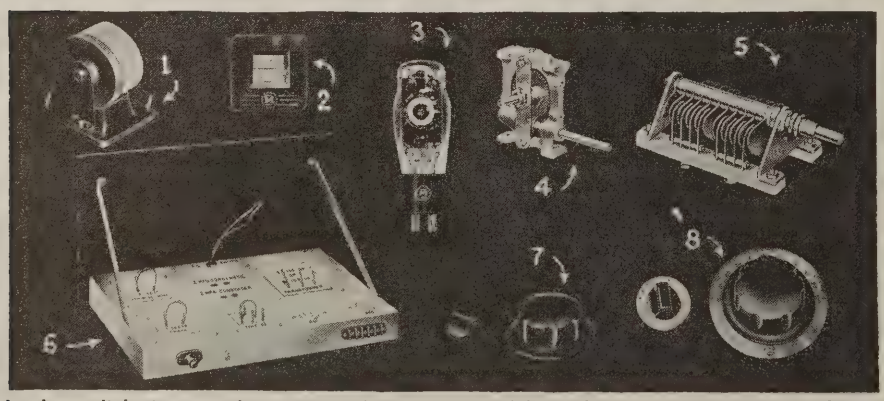
Since the armature has a contact on each side, it will make another circuit and break the previously made circuit. In this manner, associated equipment may be started or stopped with the decrease of light, or with the increase of light.

The parts may be placed on a 7" square plywood base. The layout illustrated should be followed in order to reduce the size of connecting

(Continued on page 606)



New Parts for the HAM



1—drum dial; 2—escutcheon for dial; 3—vacuum delay relay; 4—worm gear for driving condensers; 5—new transmitting condenser; 6—pre-wired chassis; 7—new knobs; 8—large and small engraved metal dials, with knobs.

● SEVERAL attractive and efficient dials are found in the new James Millen Mfg. Co. line. Among these are a drum type dial for use when condensers are mounted with their shaft parallel to the panel; a flat disc type dial with a meter type escutcheon for use with condensers having their rotor shaft perpendicular to the panel; and a right-angle worm drive assembly which may be used to give vernier coupling between a condenser and its dial.

The small drum dial mentioned above may be mounted in a round panel hole, as can the meter. Its escutcheon plate is approximately 2½" square.

The flat dial has a disc 3¾" in diameter and provides a vernier ratio of approximately 10 to 1. The drive shaft extends behind the panel so that a lead flywheel may be added, if desired.

Also interesting in this catalog is a vacuum enclosed delay relay. This comes in four models, both the "cold closed" and "cold open" types, being available for 6 or 110 volt operation. These are of the bimetallic snap disc type, and it takes about 30 seconds for the relay action to take place. It really is capable of carrying 1000 watts and the time action is adjustable over a short range by varying heater voltage. These relays come in glass envelopes with a standard 4-prong base.

Another new item of great interest to Hams is the prewired foundation unit (chassis). Also there are rugged cast aluminum chassis. Small, well designed dials and knobs are among the new parts made available by the Millen engineers. A 3 ft. antenna kit is also featured. Many set builders will be glad to know that the worm gear used on the transmitting condensers can also be bought separately. One of the new transmitting condensers, model 12035, is illustrated. It has rounded edges on the plates to minimize leakage. (See Fig. 5.)

Let's Listen In with *Joe Miller*

(Continued from page 597)

and are both good signals whenever heard. QRA for VVS, Engineer-in-charge, Govt. Radio Station, Burma Posts and Tel. Dept., Mingaladon, Burma. QRA for VVN, Chief Radio Officer, Wireless Station, Fort Madras, India. VVN is understood to be on 13.26 mc., but the veri here states VVN operates on 13.35 mc., and the engineer should know! Here's your chance to verify 2 fine DX catches, and to add Burma, a rare DX country, to your verified phone countries list. Good luck!

BECHUANALAND

ZNB, 5.90 mc., at Mafeking, capital of this British colony in central South Africa, is a fine DX bet this winter, and one of the most difficult countries to receive. It was logged here in March, 1938, rather late in winter, which shows that ZNB can be tuned for all winter, and every good DXer should go after this ace. Schedule is seemingly difficult for reception of an African on 6 mc., being 6-7 a.m., and 1-2:30 p.m. However, it was heard O.K. one morning between 6 and 7 a.m. Here would be a grand catch for anyone. We will give special notice to any DXer who proves he has heard this ace, after being spurred on to try by this article, as he'll certainly deserve at least this small recognition of his DXing ability! QRA is Radio ZNB, P. O. Box 106, Mafeking, Bechuanaland.

ITALIAN AFRICANS

ITK, 16.385 mc., at Mogadiscio, Italian Somaliland, is regularly heard phoning IAC, 17.76 mc., Coltano, Italy, near 7 a.m., with ITK using clear speech at all times, and IAC always using inverted speech. Perhaps, of late, ITK has been equipped with an inverted speech modulator, though we have yet to hear it. IUD, 18.27 mc., at Addis Ababa, Ethiopia, is an easy way to add Ethiopia to your list of countries. IUD usually calls Massawa, in Eritrea, with IDU usually replying, on 13.38 mc. IUG, 15.45 mc., also at Addis Ababa, can be heard around 10 a.m. phoning IAC. IUC, 11.955 mc., same QRA as IUG and IUD, phones IAC on 12.80 mc. in early a.m.'s from 1 a.m. onward. Reports can be sent to Mario della Spina, Radio S. Paolo, Rome, Italy. All reports are promptly verified. ICK, 9.46 mc., at Tripoli, Libya, is a rare catch, which may be heard early a.m.'s, 5-8, and also, rarely, from 3-7 p.m. Same QRA will QSL ICK.

FRENCH SOMALILAND

FZE8, 17.28 mc., Djibouti, should not be forgotten, being another FB DX country to log. According to our veri, FZE8 generally can be heard on the first days of each month, usually Thursday, from 7:30-8:30 a.m., when it communicates with France, using clear speech. This station puts in a fine signal, and QSL's very promptly. Do go after FZE8, it's really an easy catch! QRA: Le Chef de la Station FZE8, Ministere des P.T.T., Djibouti, French Somaliland.

NEW CALEDONIA

FK8AA, 6.122 mc., at Noumea, is a fine source of interest for many seekers of the really rare DX SW BC stations. Now is the best time to go after this ace, one which we are especially proud in having QSL'd. Why not go after FK8AA now, on its schedule of 2:30-3:30 a.m., on Weds. and Sats.? That will be *one* QSL you can really brag about, we sincerely assure you! And don't give up easily, as this one is heard but rarely. QRA in station list.

TURKEY

TAP, 9.465 mc., Ankara, is now the lone Turkish station on the air, as TAQ, 15.195 mc., has been discontinued. New schedule for TAP is weekdays 5:30-7 a.m., Sat. 6:30-8:30 a.m., Suns. 5:30-7:30 a.m. and daily 11 a.m.-4:30 p.m. Should be well heard near end of last schedule, as it has been heard very well around 4 p.m. Reports are welcomed, and it is necessary to include an IRC. QRA: Correspondence Dept., Radio Ankara, Ankara, Turkey.

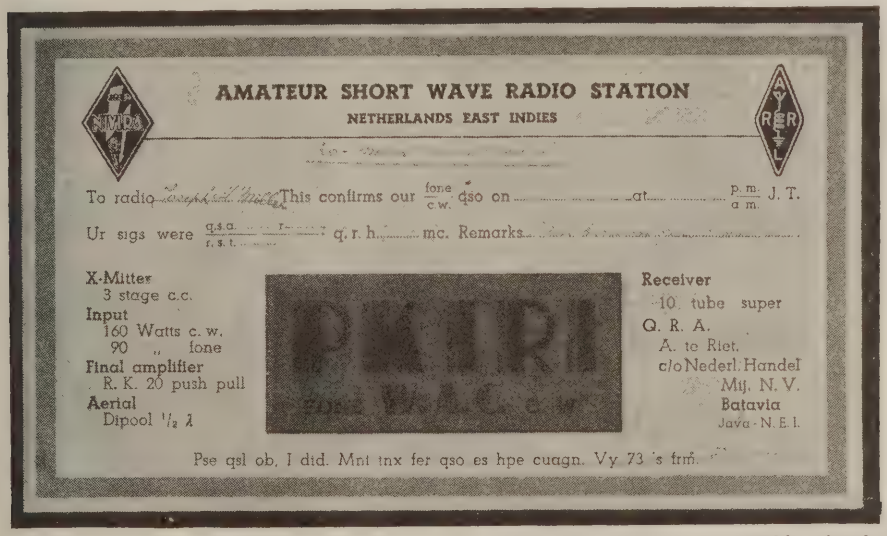
ANGOLA

CR6RC, 11.74 mc., transmitter of the Radio Club of Angola, at Luanda, should be easily heard during their afternoon schedule, making Angola an easier country to verify than before, when only CR6AA could be heard. Schedule is 6:30-7:45 a.m., Tues., Weds., and Sats. from 3:30-5 p.m., and Suns. 9:30 a.m.-1 p.m. QRA: Postal 229, Luanda, Angola. CR6AA still is a nice catch for ambitious DXers, being on 7.614 mc., and located at Lobito. Schedule here is Mon., Wed. and Sat. 2:30-4:30 p.m., best near end of schedule. P. O. Box 103 is CR6AA's QRA.

Due to the paucity of interesting amateur news, we are still "standing by" awaiting better conditions, both world and radio, before resuming this section of our item.

It was with some humor, tinged with a realization of the sadness of the present situation, that we recently listened to a local rebroadcast of a London news dispatch. The announcer had first introduced a Finnish rebroadcast from Helsinki, which came through FB. However, when the speaker at London began, there was at once evident a regularly timed signal with several notes to the second right on top of the London station. At once the announcer remarked about "bad atmospheric conditions," but the transmission continued. However, as it was evident that the speaker from London was a good deal unintelligible, several minutes later the announcer again broke in to say that "due to a magnetic storm over the Atlantic we are unable to continue the broadcast!" It was most plainly a band-jammer, so prevalent during the Spanish civil war, and easily seen that the "magnetic storm" was emanating from an enemy station! We wonder how many listeners were deceived by the announcer?

And so we close, hoping you'll try for some of the aforementioned ace catches, and wishing you all the good luck in the world, plus!


AMATEUR SHORT WAVE RADIO STATION
NETHERLANDS EAST INDIES
To radio ... This confirms our fone c.w. qso on ... at ... p.m. a.m. J. T.
Ur sigs were q.s.a. r. s. t. ... q. r. h. ... mc. Remarks ...
X-Mitter
3 stage c.c.
Input
160 Watts c.w.
90 " fone
Final amplifier
R. K. 20 push pull
Aerial
Dipool ½ λ
PK1RI
Receiver
10 tube super
Q. R. A.
A. te Riet.
c/o Nederl. Handel Mij. N. V.
Batavia
Java - N. E. I.
Pse qsl ob, I did. Mnt tnx fer qso es hpe cuagn. Vy 73 's frm.

Novel QSL card received from PK1RI, Java. Very attractive, with red and blue border stripes and call letters in black on yellow.

We Want An Answer!

• WOULD you like to see a station list showing the calls, frequencies and locations of "commercial" short wave phone stations and similar information? Preparing such a list is a big job and we won't undertake it unless you fellows want it. If we get enough letters, you'll get the list. Write and let us know.

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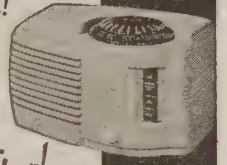

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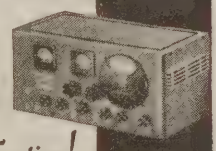

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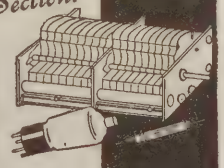

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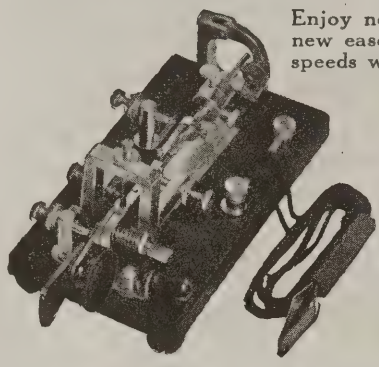

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On the HAM Bands

Edited by Elmer R. Fuller

Ten Best DX Catches During November

Name	*Call*	*Freq.*	*R*	*S*	*Miles*
Worrell	PK4KE	14.244	4	7	12,000
Fleming	PK4KS	14.02	4	6	11,900
Post	PK4KS	14.04	4	4-5	11,900
Clarke	KA1JP	14.145	4	6	11,700
Clarke	XU1B	14.125	5	6	11,300
Worrell	KA1FH	13.207	4	5	11,100
Lendzioszek	VS7RG	14.005	4	7	11,000
Deem	KA1ME	14.16	4	5	10,900
Deem	XU1B	14.16	4	5	10,900
Gabriel	KA1LZ	14.18	4	6-7	10,800

● IT begins to look as though the good DX is off the air for some time to come. Every month it is getting poorer and poorer. This last month was no exception. The DX contained in the box of ten best catches above, however, picked up somewhat from last month, when the tenth catch fell below 10,000 miles for the first time since this policy was started several months ago. This time it is up again, the tenth place being 10,800 miles from the observer.

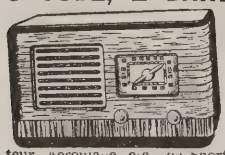
Our friends to the south, the Cubans, are again on the air and several of them have been coming in, fine business. None are in the reports for this issue, as they have been on only a few days, and since the reports were mailed to me. It is understood that the Cuban government has set up new rules and regulations for the issuance of amateur licenses. This is now in effect, and is believed to have produced better amateur signals and equipment than was common in the past.

At the present time the only amateurs who are legally allowed to operate are the EA's, HA1K, EK1, OQ5, CR6, XU, J, PK, KA, KB6, U. S. and possessions, all Latin-American countries except Haiti, Salvador and Honduras.

Thanks to Roger Legge and "Ama-Touring" ZZ2Z, heard recently, claims that he is in Iceland; LX1UU (28.16) is thought to be a G; and ES3CA is thought to be in France, due to his French accent. ZX4M, who was on board a ship in the Atlantic or the Caribbean Sea a short time ago, is now reported to be in Cuba.

There are a few states in which we have never been able, because of lack of applications, to appoint observers for Official Listening Posts. We would like to hear from someone in Idaho, Delaware, Mississippi, Nevada, New Mexico, North Dakota, Vermont and Wyoming. Also in Canada from the Provinces of Alberta, Manitoba, New Brunswick, N. W. Territory, P. E. Island and Saskatchewan.

8-TUBE, 2-BAND SUPER AC-DC



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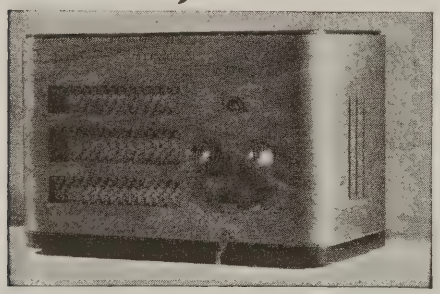

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$24.50 f.o.b. N.Y. per pair, consisting of TWO COMPLETE MASTER STATIONS.

Complete two-way wireless loud speaking system. Perfect performance. Plug into any 110 volt socket, AC or DC. Equipped with CALL-LISTEN-TALK switch and volume control. Write for information or catalogue.

Sold on 10-day trial with Money-Back Guarantee. Order today.

Jobbers, Dealers and Distributors write for special quantity discount.

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DEPT. R.T.F., CHRYSLER BLDG., NEW YORK

Sole Distributors of the
CROSLEY CHATTABOX

Short-Wave League DEPARTMENT

A few interesting QSL cards.

Last month, reports were received from the following:

Alabama	Jack Wells
Connecticut	Howard G. Kemp
District of Columbia	A. J. Hall
Florida	Major Lester
Indiana	James Kavanaugh
Iowa	Dick Mannheimer
Kentucky	Bob Taglauer
Massachusetts	Edward Lendzioszek
Michigan	Vernon Gabriel
Minnesota	W. C. Post
Missouri	R. B. Fleming
New York	Charles H. Fuller
Virginia	Everett Worrell
Wisconsin	Jesse Dana Wheaton
West Virginia	W. O. Deem
Quebec	Stanley Clarke
Western Australia	Ray Matthews

From Asia, we have the following stations reported:

Call	*Freq.*	*R*	*S*	*Where Heard*
J2KG	14.2	3	4	W. Va.
J2XA	14.15	4	7	Mo.
J4CT	14.1	4	5	W. Va.
J7CB	14.09	5	7	Mo.
J7CY	14.0	3	4	Mass.
J8CI	14.015	2	5	Mass.
VS7RG	14.005	4	7	Mass.
VU2CQ	13.963	4	5	Va.
XU1B	14.16	4	5-6	W. Va., Mo., Western Australia, Minn.
XU6KL	14.	5	6-7	Western Australia
XU7HB	14.	5	7-8	Western Australia
XU8AM	14.	5	8-9	Western Australia

AFRICA—

CN8BB	14.015	5	5-6	Mass.
EK1AF	14.12	4-5	7-9	Ind., Conn., Mich., Ala., Mass., D. C.
OQ5AB	28.67	4	7	Fla.
SU1KG	13.436	4	5	Va.
VQ8JM	14.035	4	7	Mass.

NORTH AMERICA—

H17I	14.1	5	9	Quebec
K4ENT	14.16	5	8	Quebec, D. C.
K4FKC	14.172	5	3	N. Y., D. C.
K4FCK	14.	5	9	Wis.
K7HGS	14.25	4	8	Ind.
K7HCX	14.3	5	8-9	Mich.
TG9BA	14.16	5	8	D. C.
TI2AC	14.06	4	7	D. C.
TI3AV	28.	5	8	Ind.
VP2OO	13.417	4	6-8	Va.
XE1CQ	14.065	5	9	Quebec, D. C.
XE1DQ	14.06	4	6	Conn.
XE1LV	14.09	5	4	N. Y.
XE1BG	14.	5	6-7	Western Australia
XE2GO	14.07	5	7	Ky.
YN1IP	14.1	5	7	Quebec

SOUTH AMERICA—

CE2AM	14.13	4	6	Ala.
CE3CO	14.095	5	6	Ky.
CE3CG	14.07	5	8	Mich.
CP1BA	14.137	5	8	Va.
CX2CO	14.05	5	5	Ia., Minn., Conn., Mich.
CX2PO	14.1	4	6	Ind.
HC1JB	14.2	5	4	N. Y.
HC2HP	14.35	5	4-8	N. Y., Mich.
HK3CK	14.065	5	5	Ia.
HK4AX	14.03	4	6	Conn.
HK5EM	14.03	4	5	Conn.
HK5KM	14.035	4	5	Conn.
LU2AW	14.09	5	7	Ala.
LU2EK	14.09	3	3	N. Y.
LU4BH	14.25	3	6	D. C.
LU5AN	14.04	5	6	Ia.
LU5BT	14.0	4	8	D. C.
LU8BK	14.07	5	4	Ia.
LU8AB	14.0	4	7	D. C.
OA4LR	14.12	4	6-7	Mich.
PY2AK	14.14	5	6	Quebec, D. C.
PY5AQ	14.19	5	7-8	Mich.
YV1AQ	14.0	5	9	D. C.
YV4AN	14.12	5	3	N. Y.
YV5ABQ	14.09	5	9	Quebec
YV5ABE	14.05	5	9	D. C.
YV5ACE	14.08	5	9	D. C.

EUROPE—

CT1AY	13.965	4	6	Va.
CT1OR	14.185	5	5	Va.
CT1PA	14.15	4	7	Mass.
EA7BA	14.085	5	8	Quebec, Ind., Mich.
HA1K	28.	4	5	Ind.
K6OQE	14.24	5	8	Ia.
K6BNR	14.19	5	8	Ia.
K6NYD	14.24	5	7	Ia., Mass.
K6GAS	14.155	5	5	Ia.
K6OJI	14.155	5	6	Ky., Fla., Mass.
K6NZC	28.	5	7	Ind.
K6HQE	14.33	3	5-6	Mich.
K6PTW	14.355	5	8	Mass.
K6MVV	28.1	5	4-6	Minn.
K6GLZ	28.6	5	7	Minn.

(Continued on page 608)

Announcing

A New Amateur Communication Receiver

Work All Continents With This One!

Sargent Model WAC-44

Special New Features:

NOTE: Some of the features listed here will be found in other amateur receivers, but never, at any price, have ALL of them been available in an amateur communication receiver.

- 2 Stages of R.F. Pre-Selection
- Panel Line-up Adjustments
- Voltage Regulator
- Full-Vision, CALIBRATED, "Band Spread" Dial
- Crystal Re-Set Frequency Monitor
- Improved Noise Limiter
- Built-in 5" Jensen Speaker
- New Xtal Filter Circuit
- Audio Compensator

Also These Features, which Any Good Communication Receiver Must Have:

- S-Meter, Calibrated
- 14 Tube Performance, (11 actually used, 3 being double function.)
- Isolantite Insulation
- Separate C.W. Beat Oscillator
- Tuning Range 9.5-550 Meters
- 5 Tuning Bands, highest Q on Amateur Frequencies
- High Signal-Noise Ratio
- Iron Core I.F., 456 K.C.
- Send-Receive Switch
- Headphone Jack

An Addition To Our Line—

Model WAC-44 is announced as an ADDITION to our line of communication receivers. It is not intended to replace any of our current models, as WAC-44 is designed specifically for the amateur. No changes in Model 51 or Model 11 are anticipated as a result of this announcement.

Designed Solely for Amateur Communication—

In designing the WAC-44, the amateur viewpoint has been exclusively considered. No compromises, which might have rendered the receiver more suitable for other fields have been tolerated. The circuit, coils, dial, panel, layout,—everything, has been chosen solely with regard to suitability for amateur use. As a consequence we believe we are offering the amateur the finest receiving instrument that has ever been available.

2 Stages of R.F.

In our opinion, an amateur receiver needs 2 stages of R.F. WAC-44, with its high-gain 2 R.F. stages, obtains highest detection efficiency at the 1st detector, consequently extreme sensitivity, less need for over-amplification in the I.F. The result is an unusually good signal-to-noise-ratio. Image rejection is practically complete.

Always In Alignment

Even a slight mis-alignment of the R.F. end of a receiver results in turning up the I.F. to compensate for the loss of signal strength up front. Tube hiss goes up with it, and signal-to-noise ratio goes down. The most careful factory line-up adjustments cannot be guaranteed to stay put during transportation, temperature or humidity changes, etc. The owner of a WAC-44 receiver KNOWS that his R.F. amplifier is correctly aligned at all times. Trimmers for both R.F. stages and detector are on the panel.

The Band Spreader

More correctly called "Amateur Band Tuning Dial." It is just that,—calibrated for patrolling each band (except 160 which is handled on the main dial). Calibration is accurate and can be checked and reset from the monitor.

Xtal-Reset Frequency Monitor

Harmonics of the B.F.O., coupled to receiver input through the monitor switch, serve as the means of checking calibration. B.F.O., when used this way is adjusted to the Xtal frequency. Thus no need to depend on broadcast stations. We furnish a card with each receiver listing the harmonics.

Net Price, Complete

Price includes a full set of R.C.A. tubes, built-in speaker, power supply for 50/60 cycle, 110 volt A.C. operation. Code Word "WACAA." Ready to operate, nothing else to buy. Net Price **$139.00**

If desired, as additional equipment, a separate 10" Jensen speaker in crackle-finished metal cabinet can be supplied for WAC-44. Operates from headphone jack. Net Price **$10.00**

DELIVERY JANUARY 10th
Order NOW
Write for Complete Description

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My Creed---

TO give you specialized personal attention of genuine value that you can't get from other wholesalers.

TO finance all time sales myself so you can buy with less cost—less red tape—quicker delivery. These terms financed by myself are the best you can get anywhere.

TO take your equipment in trade at a liberal allowance.

TO allow you to try any receiver for ten days without obligation and to cooperate with you to see you are 100% satisfied.

I stock all receivers of all makes—more than 25 models—and will help you get the right one. Just write me fully about what you have in mind. A few receivers in stock are:

Receiver	Cash Price	Down Payment	12 Monthly Payments
S20R & NC44A	$49.50	$9.90	$3.49
SX-24 Defiant	69.50	13.90	4.90
Sky Buddy	29.50	5.90	2.08
NC100A	120.00	24.00	8.48
NC101X & NC101XA	129.00	25.80	9.11
HQ-120X	138.00	27.60	9.75
Super Pro	279.00	55.80	19.71
RME-70	138.60	27.72	9.79

I have a complete stock of all amateur receivers, transmitters, kits, parts of all sorts. Send to me for any equipment in any catalog or ad. I guarantee you can't buy for less or on better terms elsewhere.

All orders and inquiries personally attended to by Bob Henry, W9ARA. You can reach me by letter, telegram, phone, or visit nearly 24 hours a day 365 days a year. Write for any information. Your inquiries and orders invited.

HENRY RADIO SHOP

BUTLER W9ARA MISSOURI

Be a Champion with a Genuine VIBROPLEX "CHAMPION"

only $9.95 At Your Dealer's

A "STAR" Performer

Standard size black base. Chromium finished top parts. Equipped with 3/16" diameter contact points. Furnished without circuit closer, cord and wedge.

Like all true champions, this new Vibroplex "CHAMPION" defies competition. Handsome in design, sturdily built and a "STAR" performer . . . the "CHAMPION" is our answer to the demand for a BUG of established quality, proved sending ability and assured ease of operation at a price within the reach of everyone. Designed primarily for the amateur, professional operators will find the "CHAMPION" amply qualified to give an expert account of itself on any assignment. See the "CHAMPION" at your dealer's to-day. If he cannot supply you, write or order direct from us. Money order or registered mail. Write for illustrated catalog.

THE VIBROPLEX CO., Inc.

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Now! BALLAST REPLACEMENT made AMAZINGLY SIMPLE!

Only 4 standard types of Amperite AC-DC Regulators will replace 90% (over 100 types) of AC-DC Ballast Tubes now in use! WRITE FOR CHART AR.

New Low Price $1.00 List

AMPERITE Co. 561 BROADWAY, N. Y.

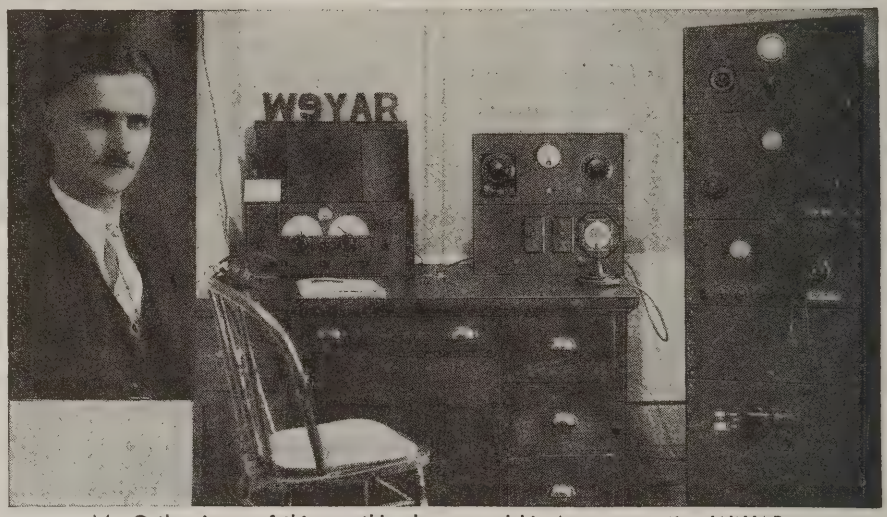
AMPERITE AUTOMATIC REGULATORS

"Award of Honor" Plaque

For Best HAM STATION PHOTO

Goes to

Norman Orth, W9YAR



Mr. Orth, winner of this month's plaque, and his Amateur station W9YAR.

Editor,

Herewith is a photo of myself and station for your contest. The entire station is home-made except the receiver which is an RME-69. The transmitter consists of five decks. The lower deck has two power supplies on one chassis—a 450 volt supply for exciter and a 1,250 volt supply for the final. The second deck is now used for extra coils and the bias batteries—it formerly held the small power supply. The third deck is a three-tube band-switching exciter that covers all bands from 160 to 10 meters. It consists of a 47 xtal osc. with six xtals on a switch, followed by a 53 doubler into an RK-41 buffer. This is link-coupled to the push-pull RK-20's in the final located on the fourth deck. The RK-20's are in a horizontal position to allow short grid and plate leads, also properly shielding the input from the output circuit. The top deck holds the antenna tuning unit for either series or parallel tuning. Panels on the entire unit are masonite. The antenna is a forty meter center-fed Zepp with 66 feet top and 45 feet feeders.

The rig is used mostly on 40 and 20 meter CW and 160 and 10 meter phone. On phone transmission suppressor-grid modulation is used. The modulator consists of a 56 into a 56 into push-pull 45's in class A. (On deck.) Above modulator is the frequency monitor, also used for keying, and on the same chassis the Jones over-modulation indicator using a 76 tube. Power supply for modulator and monitor behind desk.

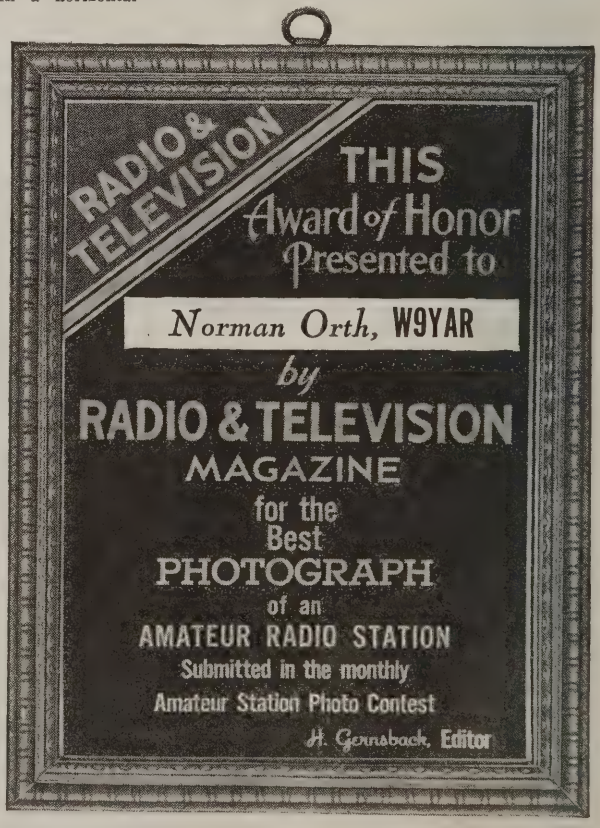
The power input is 250 watts on CW and about 100 watts on phone.

This station has been licensed about four years. Being active only a few hours evenings, I have worked all states and all the provinces of Canada and Alaska.

In closing, I cannot help but commend you on your "FB" magazine, as it has helped me many times.

NORMAN ORTH, W9YAR,
Kiel, Wisc.

Full rules for the monthly contest appeared on Page 457 of the December issue.



Here is the new "Award of Honor" Plaque which measures 5" x 7" in size. It is handsomely executed in colors on metal, and is framed, ready to hang on the wall. The letters appear in gray against a beautiful black background, and we are sure that our amateur friends who are awarded one of these new "badges of merit" will be more than pleased with it. The name of the winner will be suitably inscribed.

New Sargent Receiver

Model WAC-44

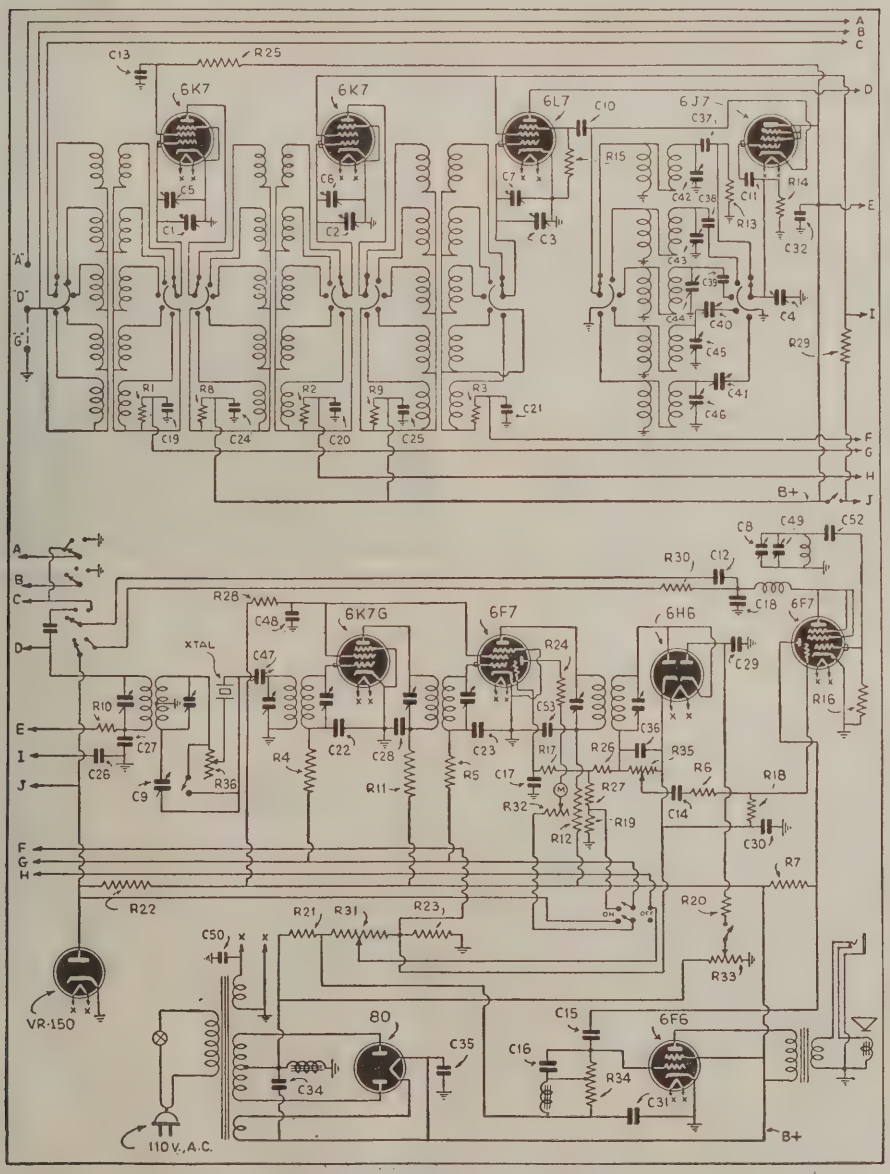
Particularly designed for Amateur Reception. Tunes over 5 bands covering 9.5 to 550 meters. Has B.F. oscillator, built-in loud speaker, noise eliminator and Xtal filter.

● THE Model WAC-44 is a receiver that has been designed strictly for *amateur communication work*. All of the materials, the circuit itself, the layout, controls, etc., have been incorporated in the set as their usefulness to the amateur dictates. Considerations which otherwise would make this receiver more applicable to other fields of operation have been totally disregarded in an effort to obtain the highest possible efficiency on the amateur frequencies. As a result, the WAC-44 receiver has exceptionally high efficiency on all amateur bands and a signal-to-noise ratio that is extremely high.

The input of this receiver consists of two stages of sharply tuned R.F. amplification and a tuned input to the first detector. Inter-stage coupling is inductive and sufficiently loose so that good selectivity can be obtained. On the higher frequencies, a slight amount of

(Continued on page 610)

The new Sargent Model WAC-44 receiver.



Circuit of the model WAC-44 receiver.

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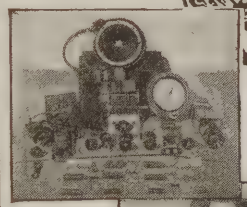
I offer you a new and altogether different type of practical Training for a money-making career in Radio and Television. No matter if you desire to BE YOUR OWN BOSS in your own business, or hold down a good job in Radio, my Personalized Training will quickly give you the useful knowledge to win success. I make it EASY for you to get started.

YOU LEARN RIGHT AT HOME in SPARE TIME . . . EARN from the START

YOU DO PRACTICAL EXPERIMENTS with real Radio Equipment **. . . with your own hands.** Thus the principles of Radio become crystal-clear to you. The valuable spare-time BUSINESS BUILDERS I supply will show you how to put this knowledge to work in handling profitable Radio service jobs while learning.

YOU GET PROFESSIONAL TEST EQUIPMENT *plus* EXPERIMENTAL OUTFITS



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146 RADIO PARTS • RADIO TOOLS • All-Purpose Analyzer

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It makes no difference what your education has been. My Training starts at the beginning of Radio, covers in a simple understandable style all essential subjects including Television, Electronics, Facsimile Radio, Radio-Set Repair and Installation.

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I offer Advanced Training for those already in Radio. Get complete details in my FREE 52-page Book.

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Tear off this coupon, mail in envelope or paste on penny postcard. Servicemen—Check here ☐.

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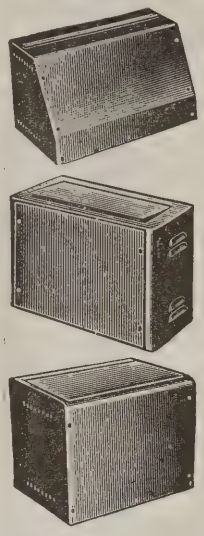

It's no miracle that so many Amateurs specify PAR-METAL when they build their rigs. PAR-METAL parts are easy to use—you can assemble your chassis, panels, racks, etc., with a minimum of effort, and interchange them almost at will. You will find them to be accurately machined, efficiently constructed, and finished durably and attractively.

FREE Catalog Now Ready

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HALLICRAFTERS

New

S-19-R SKY BUDDY

S-20-R SKY CHAMPION

The new S-19-R Sky Buddy uses more tubes and covers from 44MC to 545Kc. The new S-20-R also has more tubes, with 2 I.F. stages, Dickert Automatic Noise Limiter, Separate Electrical Band Spread (inertia tuning), Drift-Compensated H.F. Oscillator and covers 44MC to 545 Kc.

S-19-R complete $29.50
S-20-R complete $49.50

NOW IN STOCK FOR IMMEDIATE SHIPMENT

CAMERADIO CO.

963 LIBERTY AVE. PITTSBURGH, PA. • 30 TWELFTH ST., WHEELING, W. VA.

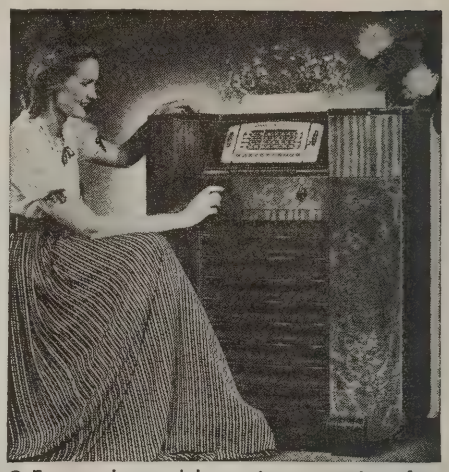
Established 1919

New Frequency Modulation Receivers

(Continued from page 592)

Laboratories, Whippany, N. J.; Stromberg-Carlson Telephone Manufacturing Co., Rochester, N. Y.; the Travelers Company, Hartford, Conn.; The Milwaukee *Journal* and The Worcester, Mass., *Telegram.*

Three stations are already operating in the New England area and several are under construction in the mid-west and west.



G-E console model receiver covering frequency-modulated band; also broadcast and usual S-W bands.

Condensers

Symbol *Description*

C-1—20 mmf. tuning condenser
C-2—.02 mfd., 400 V. paper
C-3—47 mmf. mica
C-4—1,200 mmf. mica
C-5—.05 mfd., 200 V. paper
C-6—500 mmf. trimmer
C-14—47 mmf. mica
C-15—470 mmf. mica
C-16—22 mmf. mica
C-17—100 mmf. mica
C-18—100 mmf. mica
C-19—.005 mfd., 400 V. paper
C-20—.002 mfd., 600 V. paper
C-21—470 mmf. mica
C-22—.002 mfd., 600 V. paper
C-23—220 mf. mica
C-24—.005 mfd., 400 V. paper
C-25—.05 mfd., 400 V. paper
C-26—.005 mfd., 600 V. paper
C-27—.005 mfd., 400 V. paper
C-28—.05 mfd., 400 V. paper
C-29—.05 mfd., 200 V. paper
C-30a—20 mfd., 250 V. dry electrolytic
C-30b—20 mfd., 250 V. dry electrolytic
C-30c—40 mfd., 250 V. dry electrolytic
C-30d—20 mfd., 25 V. dry electrolytic
C-31—.01 mfd., 200 V. paper
C-32—470 mmf. mica
C-33—.01 mfd., 400 V. paper
C-34—.05 mfd., 200 V. paper
C-35—2-15 mmf. antenna trimmer
C-36—7-23 mmf. air trimmer

Resistors

R-1—2200 ohms, ½ W. carbon
R-2—6800 ohms, ½ W. carbon
R-3—47,000 ohms, ½ W. carbon
R-4—330 ohms, ½ W. carbon
R-5—470,000 ohms, ½ W. carbon
R-6—47,000 ohms, ½ W. carbon
R-7—470,000 ohms, ½ W. carbon
R-8—4,700 ohms, ½ W. carbon
R-9—220 ohms, 2 W. carbon
R-10—330,000 ohms, ½ W. carbon
R-11—100,000 ohms, ½ W. carbon
R-12—100,000 ohms, ½ W. carbon
R-13—120,000 ohms, ½ W. carbon
R-14—2 megohm volume control
R-15—82 ohms, ½ W. carbon
R-16—220 ohms, ½ W. carbon
R-17—15 megohms, ½ W. carbon
R-18—220,000 ohms, ½ W. carbon
R-19—470,000 ohms, ½ W. carbon
R-20—1500 ohms, ½ W. carbon
R-21—2200 ohms, 1 W. carbon
R-22—1600 ohms, 3½ W. wire-wound
R-23—2200 ohms, ½ W. carbon
R-24—100,000 ohms, ½ W. carbon
R-25—33,000 ohms, ½ W. carbon
R-26—220,000 ohms, ½ W. carbon
R-27—2.2 megohms, ½ W. carbon

Switches

S-1—Tone switch
S-2—Phono switch
S-3—Power switch—on S-2

Transformers

L-1—Antenna transformer
L-2—Oscillator transformer
L-3—1st I.F. transformer
L-4—2nd I.F. transformer
L-5—I.F. limiter
L-6—Discrim. transformer

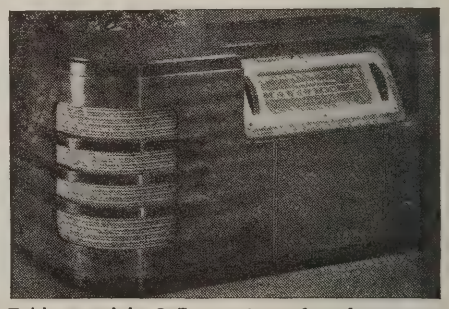


Table model G-E receiver for frequency-modulation band only.

Simplified Photo-Cell Units

(Continued from page 600)

leads. The entire unit may be placed in a closed container with an opening to admit light, and thereby increase the sensitivity of the circuit.

For localities where electrical power is not available, the *battery-operated* type is recommended. Essentially this unit is similar but uses a slightly different circuit and a battery type 31 tube.

This unit may be used for a number of simple photo-cell applications and will be most sensitive where stray light is shielded away and the control light is directed on the photo cell. Generally, photo-cells are more sensitive in localities where comparative darkness exists. In such cases a small amount of additional light is sufficient to operate the unit. On the other hand, in well-lighted places, considerable difference in light intensity may be required in order to activate the equipment.

This article prepared from data supplied by courtesy of Allied Radio Corporation.

Complete Parts List for Photo-Cell Kit, A.C. Type

1—Baseboard
1—10 megohm, ½ watt resistor
1—4-prong socket
1—6-prong socket
Line cord resistor
3—Fahenstock clips
1—Potentiometer, 1,500 ohms
1—Bracket
1—Relay
1—Photo-cell
1—Raytheon 43 tube
1—8 mf., 200-volt condenser
1—500 ohm, 2 watt resistor
1—Knob
1—Hardware kit:
Seven 3/8" wood screws, four 5/8" wood screws, 10 feet hookup wire.

Parts for Battery-Operated Photo Cell

1—Adjustment control, 3 megohms, UM165
7—Fahenstock clips
1—Knight S.P.D.T. relay, 5,000 ohms
2—Baseboard 4-prong sockets
1—Mounting bracket
1—Wood baseboard
1—G.M. photo cell
1—Knight type 31 tube
1—3 megohm, ½ watt resistor
1—Hardware kit, consisting of:
Thirteen 3/8" wood screws, 7 soldering lugs, 5 feet hookup wire.

Accessories

1—Dry cell "A" battery
2—Knight "B" batteries
2—"B" battery plugs

R. & T. 10-Tube Television

(Continued from page 591)

choke and one of the condensers. Using a resistor after the condenser instead of a choke would help in this case.) The hum modulation of the beam of the C-R tube due to the grid-cathode voltage variations would then show as a slight darkening of one-half of the picture. The increased focusing and accelerating voltages together with other factors in tube design make it possible to get a finer focal spot on the 5" Videotron than on the 3" size tubes. This increased fineness of the focus improves the picture detail very considerably.

The higher voltage also involves some changes in the design of the high voltage bleeder system, as indicated on the diagram. It will be noted that the positive high voltage is no longer grounded to the chassis. This feature reduces hum modulation of the cathode ray beam. Grounding the positive is standard oscilloscope practice, but it has the disadvantage that the grid is then at a high *negative* potential with respect to ground, and the fluctuation of the high voltage due to even a small percentage of hum will drive the grid up and down several volts with respect to the cathode. This ripple modulation may be bad enough to be annoying in the picture.

It was found that the stiffer beam was not only more difficult to *deflect* but also more difficult to *modulate*. Certain changes in the video amplifiers and the radio frequency amplifiers, however, made possible a little higher gain overall. Wonderfully clear pictures were received, the fineness of detail being much superior to those obtained on a 5" receiver assembled from a kit (now no longer on the market) using a superheterodyne circuit and many more tubes. The changes were: (1) removal of damping resistors from across all coils in the R-F amplifiers; (2) increase of plate load resistor in the two video amplifier stages from 5,000 ohms to 10,000 ohms.

The method of tube mounting is clearly shown in the photographs. Note that rubber tubing has been used to cushion all contact between tube and panel. The old cathode ray tube socket support is used to support the hind end of the new Videotron socket and attached cable.

The new power supply diagram is given on page 591 and the photos show clearly how the various parts are mounted on the power supply chassis. Great care must be taken in the choice of wire to carry these high and *extremely dangerous* voltages. The wire specified in the parts list is quite superior without being excessively costly. Please remember that voltages used in this set are *exceedingly dangerous. Your first shock will probably be your last!*—PLEASE TAKE HEED. Keep all high voltage leads in your wiring where they *won't be touched* and where, in case of insulation failure, some part easily touched will not be made alive.

The sound section was left the same as it was. This was found quite satisfactory.

From the new high voltage power supply to the main chassis a well insulated 4-wire cable was used with a 4-prong connector at each end. Both the power supply chassis and the set chassis were provided with suitable 4-prong sockets. In the case of the receiver chassis, the socket formerly holding the 81 Radiotron was used.

It will be noted that the grid of the NU5AP4 Videotron is connected to the last video stage through a coupling condenser as before.

The new *sweep amplifiers* for deflection of the beam in the Videotron are connected right to the existing coupling condensers (which were in the output circuit of the sweep oscillators) to the deflecting plates of the 3" tube formerly used. The coupling capacities between the output of the sweep amplifiers and the deflecting plates on the 5" tube (C_5 and C_{5x}; C_6 and C_{6x}) are each two condensers in series to permit the use of low cost tubulars at this point. Condensers of sufficient voltage rating to be used alone here are very much more costly than the two tubulars used in series to get the same voltage rating.

R_1 is the *vertical size* control and operates by taking more or less of the output voltage from the vertical sweep oscillator and applying this to the input of the sweep amplifier. R_7 is the *horizontal size* control and works in a similar manner. R_{19} is the *vertical centering* while R_{20} is the *horizontal centering* control. These center the picture with respect to the opening in the front mounting of the Videotron by applying D.C. potentials of proper tube to the deflecting plates in the picture tube. R_{24} is the *focus* control. This control makes the picture sharp by focusing the electron beam in the picture tube to a fine point at the screen. The focus is determined by the ratio of the potentials on the first (or focusing) anode and the second (or accelerating) anode. R_{13} is the *brightness* control, which sets the average brightness of the picture by varying the bias on the Videotron's control grid. All other controls remain as before.

Space was found on the main chassis for the two sweep amplifier tubes right near the sweep oscillators.

Again Jerrier Haddad, senior at Tech., did the actual construction work involved

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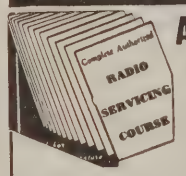

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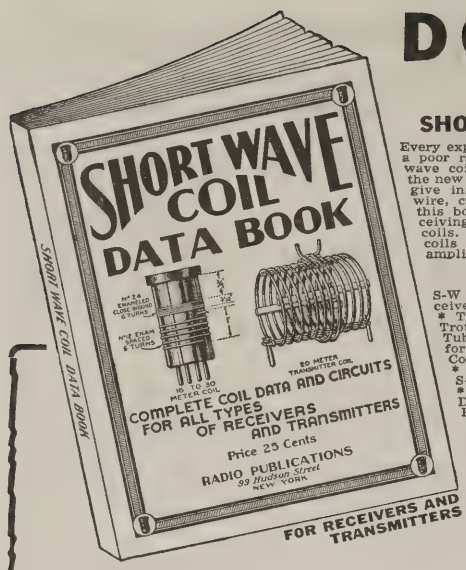
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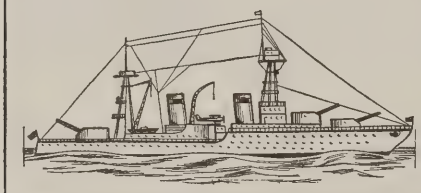

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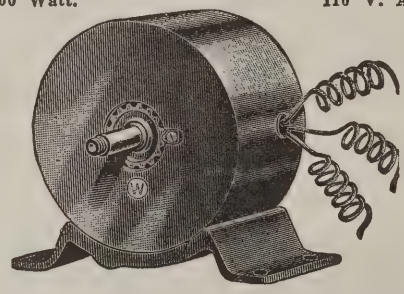

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in the change from 3" to 5" tube operation. I wish to acknowledge his fine cooperation.

The author will be glad to answer any reasonable questions concerning the televisors described in these three articles. Address all communications in care of RADIO & TELEVISION, 99 Hudson St., New York City, and enclose self-addressed stamped envelope.

Parts List for 5-Inch Tube Change

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3—2 meg. potentiometers—R1, R19, R20
1—3,100 ohm ½ watt resistor BT½—R2
2—200,000 ohm 1 watt resistors BT1—R3, R6
5—2 meg. ½ watt resistors BT½—R9, R15, R16, R21, R22
1—150,000 ohm ½ watt resistor BT½—R5
1—500,000 ohm potentiometer—R7
1—1,000 ohm ½ watt resistor BT½—R8
2—50,000 ohm 1 watt resistors BT1—R9, R11
1—3,000 ohm 1 watt resistor BT1—R10
1—1 meg. ½ watt resistor BT½—R12
1—100,000 ohm potentiometer—R13
2—100,000 ohm 1 watt resistors BT1—R17, R18
1—1 meg. 2 watt resistor BT2—R23
1—300,000 ohm potentiometer—R24
1—250,000 ohm 1 watt resistor BT1—R14

CORNELL-DUBILIER

1—25 mf. 50 volt condenser type EDJ-3250—C1
1—.1 mf. 400 volt condenser type DT-4P1—C2
4—.1 mf. 1600 volt condensers type DT-16P1—C3, C3X, C4, C4X
4—.005 mf. 1600 volt condensers type DT-16D5—C5, C5X, C6, C6X
1—.01 mf. 400 volt condenser type DT-4S1—C7
2—1 mf. 2000 volt D.C. condensers type TQ-20010—C8, C9

KENYON TRANSFORMER CO.

1—Type T203 transformer—T1

THORDARSON ELEC. MFG. CO.

1—Type T19F81 transformer—T2
1—Type T17C40 choke—L1

R.C.A.

1—Type 879 tube
2—Type 6F8G tubes

NATIONAL UNION

1—Type 5AP4/1805-P4 cathode-ray tube

AMPHENOL

2—Octal sockets—MIP
1—Large 11-prong cathode-ray tube socket
1—4-prong MIP socket
1—4-wire cable and connector plug

CORNISH WIRE

5,000 volt insulation rubber, lacquered braid, type Con Cor

On the HAM Bands

(Continued from page 603)

Call	*Freq.*	*R*	*S*	*Where Heard*
KA1FH	13.207	4	5	Va., Ind.
KA1ME	14.14	5	7	Ia., W. Va., Ala., Mo., Minn.
KA1JP	14.145	4	6	Quebec
KA1CS	14.14	5	7	Quebec, Western Australia, Ala., Mo.
KA1LZ	14.26	5	8	Ind., Mich., Ala., Minn.
KA1AP	14.14	4	8	Mo.
KA1CW	14.13	4	8	Mo., Ala., Western Australia
KA1ME	14.18	3	8	Mo.
KA1BB	14.27	5	5	Ala.
KA1AB	14.	5	8-9	Western Australia
KA1LB	14.	5	9	Western Australia
KA1OZ	14.	5	9	Western Australia
KA4LH	14.105	5	6-8	Minn., Ala.
KA7EF	14.16	4	7	Mo., Ala.
PK4KS	14.244	4	7	Va.
PK6XX	14.02	4	6	Mo.
ZL3DJ	13.216	4	4	Va.
PK4JD	28.003	4	6	Va.

International Radio Review

(Continued from page 583)

an improved circuit which is being employed in RCA receivers. This consists of a blocking oscillator and a discharge device combined in the same envelope. A circuit which can be operated from frequencies of a few cycles to more than 100 kc. is shown at Fig. 5H.

Editor Builds Ideal Installation

(Continued from page 586)

Little H.F. Attenuation

A distance of approximately 60 feet lies between the two receivers but there was surprisingly little attenuation of high musical frequencies when using this system. However, in order to insure the maximum of highs, the writer installed a 300,000 ohm resistor with built-in switch in series with the needle scratch filter employed in the phono-radio. When this control is turned in a fully counter-clockwise position, the scratch filter functions normally, but as it is turned in a clockwise direction more resistance is cut in until, after 300,000 ohms have been added, the scratch filter circuit is opened completely by means of the built-in switch. With this arrangement, virtually all the highs which are attenuated when the scratch filter is in use are forced through, despite the relatively high capacity of the long line.

Facsimile, Too!

The writer also wished to add a Reado facsimile recorder as a permanent unit in the RAE-84. The instructions accompanying the Reado show various means of connection, and in the interest of simplicity the one shown in Figs. 3 and 3A was decided upon. The parts used to make the installation were a 4-prong chassis mounting socket, a 4-prong plug, and a 3-pole double throw switch. Two of the arms of the switch were connected to the plates of type 46 pushpull output tubes, while the remaining arm was connected to the high voltage B supply. When thrown in the one position, the switch then connected the circuit of the set in a normal way—that is, the tubes feed into the pushpull output transformer. When thrown in the other position, the B supply is connected through the socket plug and Corwico 3-conductor shielded cable to the center tap of the transformer in the Reado. The outer terminals of this transformer are connected to the plates of the receiver's output tubes. The shield is connected to the ground on the Reado and the ground on the set.

A final refinement installed in this receiver was a change-over from the microphone supplied for home recording to a studio type double button Shure carbon microphone. The microphone socket installed in the set was replaced with a 4-prong unit so that an additional length of the 3-conductor shielded lead might be used in order to avoid any possible pick-up in the mike cable. The fourth terminal of the newly installed socket was grounded and this, of course, connected to the shield through the plug. The end of the shield at the microphone must be carefully insulated, as it will "short" the diaphragm of the microphone to ground if this is not done.

When installing this microphone—a Model 22-N—additional resistance to the value of 15,000 ohms was added in series with the lead feeding the microphone transformer. This resistor was bypassed by a ¼ M. F. condenser, in order to avoid the frequency attenuation.

With the addition of a wired remote control to the TRK-12, the installation was complete. *And how!*

Now You Can Record Parlor Songsters

(Continued from page 592)

which has already been tested in various public and private schools.

Mechanically the apparatus centers around the synchronous self-starting motor. It is ready for operation simply by plugging in the light socket for 110-115 volts, 60 cycles. The discs are cut from the outside in at 112 lines an inch, which allows a full seven minutes on each side of a 12 inch blank, or a little more than five minutes on a 10 inch record; smaller records can be used if desired.

The makers of the new recorder stress its simplicity. Practically anybody can operate the equipment and, other than a few drops of oil once in a while, it requires no attention or upkeep. Complete diagrams accompany each machine and indicate all the wearing points that need lubrication.

The recorder uses earphones instead of a meter for monitoring both quality and volume. This earphone feature is a new idea in conjunction with recording machines for home use.

The only mechanical adjustment in the entire assembly is for the depth of the cut. It works over 180 degrees of a circle only and is extremely simple to operate.

The *playback* mechanism by which the record just cut can immediately be played back is controlled by a single switch. Special acetate playback needles are used.

This recorder can be used for a public address system with microphones by disconnecting the earphones and plugging into the loud-speaker which is, of course, part of the machine. In the case of the portable model, the loudspeaker is set in the carrying case cover and can be removed as far as 25 feet from the machine itself.

Off-the-air (radio program) recordings can easily be made by placing the microphone in front of the radio loudspeaker. Recordings may be made directly from radio by running the two voice coil leads into the microphone input jack.—*Data supplied by courtesy of Universal Microphone Co.*

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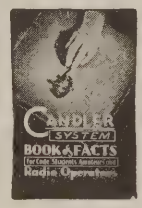

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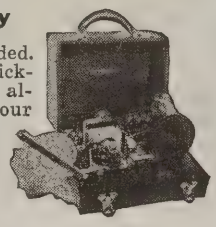

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New Sargent Receiver

(Continued from page 605)

inter-coupling has been permitted so as to give partial regeneration. The result is an extremely sharp pre-selector which gives almost perfect image rejection. Each R.F. stage and the first detector have an adjustable trimmer controllable from the panel.

The H.F. oscillator and associated circuits are operated through a voltage regulator tube which compensates for wide fluctuations in line voltage.

Band Spread: The band spread system is an improved mechanical method of band spread which has been used in Sargent receivers since 1933. Complete freedom from mechanical back-lash has been obtained. The tuning condenser, which has four sections, is mounted in a cradle which can be swiveled a small amount to each side of center. This swiveling action is obtained by operation of the band spread dial and this gives the vernier action required to spread out a small band of frequencies over a large scale. It is most convenient in any amateur receiver to have a separate dial calibrated for the amateur bands, and if the band spreading were done electrically, it would be necessary for this separate dial to operate a small four-gang variable condenser connected in parallel with the larger tuning unit. This would involve parallel insulation losses on all circuits to which the condenser would be connected, as well as additional wiring which could throw dead-spots in and around the 10 meter band. Losses of this type are entirely eliminated by the mechanical band-spreader. The band-spread dial could more accurately be called an *amateur band tuning dial.* This dial (on the right in photo) has scales for 10, 20, 40, 75, and 80 meter *amateur* bands. A full calibration is given for each band so that the entire band can be patrolled just as the broadcast band can be on the ordinary BCL receiver. The calibration is accurate and the frequency monitor on the receiver furnishes a means of resetting it so as to keep it at all times right on the dot. Five tuning bands are included, covering a total range of 9.5 to 550 meters. The main tuning dial covers these, the spread on 160 meters on the main dial being sufficient so that it is not necessary to put it on the band-spreader.

A reliable frequency monitor is incorporated in the receiver, the beat frequency oscillator being adapted for this purpose. The monitor switch couples the BFO to the receiver input so that the harmonics are sufficiently strong to be heard right down through 10 meters.

Added convenience and compactness have been obtained by including a 5-inch Jensen speaker in the cabinet with the receiver. An external speaker may be plugged in through the headphone jack.

WAC-44 incorporates an improved noise eliminator wihch practically eliminates automobile and ignition noises from short wave reception. The noise eliminator is adjustable and thus adaptable to individual locations. An improved crystal filter circuit is incorporated in the receiver. As an aid to amateur phone reception, with the crystal in operation, there is an audio compensator which tends to accentuate the high frequencies and taper off the lows, the exact reverse of the crystal action in its most selective position. The resultant of the two is intelligible speech while using the crystal. The audio compensator is continuously variable so that any desired amount of compensation can be obtained. An I.F. frequency of 456 kc. is used. Iron core I.F. transformers are used throughout.

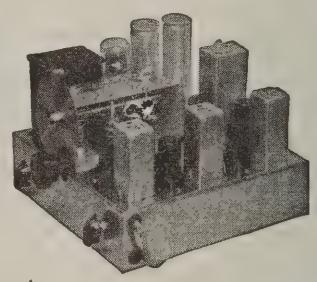
The audio output system consists of a single 6F6G tube. The second detector couples through a triode driven tube into the 6F6G, resistance coupling being used in both stages. Maximum power output, about 3.5 watts, is sufficient for the built-in speaker or for an external one.

Frequency Modulation Adapter

● THE latest development in modern radio transmission and reception—frequency modulation, as developed by Major Edward Armstrong—is made available for present sets through the new Browning *frequency modulation adapter.* (In case you haven't kept up on your F.M. it provides relatively static-free reception with the full dynamic and frequency range of the original program.)

The Browning adapter consists of R.F., I.F. and detection systems which may be readily connected to the present audio system of your receiver and placed in the same cabinet. The wired I.F. and detector system is available as kit BL-3000A—a 3-mc. broad-band I.F. amplifier consisting of a portion of the R.F. amplifier and mixer circuit, two I.F. stages, limiter, detection system, and output volume control with A.C. switch, built on a chassis 10½" x 9½" x 2½" with all holes punched for the R.F. tuner, power supply and, if desired, a push-pull audio power amplifier. The I.F. amplifier comes completely wired and carefully aligned. For operation, it requires one 1852 in the first I.F. stage, one 6SK7 in the second I.F., one 6SJ7 as limiter and one 6H6 as detector.

Used with this is a high frequency tuner, known as the BL-40T kit. It is a high frequency unit, wired and aligned, and consists of a tuned antenna circuit, one stage of R.F. amplification and an oscillator circuit. It covers a frequency range of



approximately 40 to 54 mc., and but seven connections need be made to connect it to the 3000A I.F. amplifier. The tubes it requires are a 6SK7 in the R.F. stage, and a 6K8 mixer oscillator.

TELEVISION CONTEST AWARD

So many and so excellent were the entries received in the *R. & T. Free Television Course Contest* that the judges spent hour after hour going through the entries. Finally the choice narrowed down to twenty letters, then to ten—finally to two. After much discussion, the winner was chosen. The winning letter follows:

First Prize

Why I Want to Become a Television Expert

Laurence E. Neville, 5368 Delmar Blvd., St. Louis, Mo.

● *IN the history of the world, the men who achieved high places, have been the men who pioneered. The reasons for their success were two-fold. First, in pioneering, they contributed to the progress of man, and mankind was grateful. Secondly, because they were pioneers, their competition was limited in quantity, though perhaps not in quality.*

That is why I would like to become a television expert. Television is a new frontier . . . a new Klondike . . . a new California . . . offering its riches to the hardy, the daring, and the far-seeing. That it will become a commonplace thing, even as radio, is a foregone conclusion. That it will contribute to the progress of man is certain. That it will make the fortunes of those who give unstintingly of their time, their thought and their labor, is also certain. And because television is a frontier, competition for years will be limited.

The well-established professions, semi-professions, industries and trades are crowded with more applicants than jobs. **The frontiers are crowded with more opportunities than candidates.** *An hour spent in the study of television today, in ten years may be worth more than a man's present yearly salary.*

And the beautiful thing about television is that it is not a crude and rugged frontier to cross. It is a frontier to be conquered by mathematics, the slide rule, and the measuring instruments of the electrical and optical laboratory—not by guns, bear-traps, picks and shovels. It is a frontier that may be explored in one's own living-room while enjoying the comforts of home, and the even tenor of one's ordinary life.

Short-Wave Diathermy

(Continued from page 589)

at any medical supply house. They are made in any size or shape to fit the particular parts of the body under treatment. Generally a physician will have several different sets available with his machine. Fig. 2 shows how the pads used with the machine described in this article were made.

Caution: It is not advisable, under any circumstances, to sell these machines directly to the public, inasmuch as serious harm may be done if treatment is applied for the wrong types of illnesses or for incorrect periods. A person undergoing treatment need not necessarily feel any heat to know that the machine is operating. It is only when sufficient current is fed to the electrodes that the heating effect becomes apparent. Yet, the no-heat portion of the treatment may be equally dangerous or even more so than the actual heat treatment if improperly applied or for too long a period.

The Circuit

As will be noted in Fig. 1, the circuit is a push-pull Hartley oscillator. It performs in a stable manner and displays no tendency to stop oscillating under varying load conditions. Full-wave rectification with some ripple filter is employed. Circuits lacking proper rectification and filtering are great interference generators. Proper rectification will also add several hundred hours of working life to the oscillator tube.

It should be noted that two bias resistors are used, one shunted by a shorting switch. For ordinary short-wave therapy, the regular control grid bias of 10,000 ohms is used. For high frequency cutting, cauterizing, coagulation treatments, dessicating, etc., this bias is increased to 35,000 ohms by the addition of the 25,000 ohm resistor. The power supply delivers about 2000 volts. Therefore, the total plate current of both oscillating tubes (in order not to exceed the dissipation rating with a bias of 10,000 ohms) should not run more than 250 milliamperes, as read on the meter on the front panel. All components of the oscillatory circuit are mounted on porcelain stand-off insulators, as shown in the illustrations. Sockets for both rectifier and oscillator tubes are made of isolantite.

As regards the wiring procedure, any amateur can take care of this O.K.

Adjustments

In tuning up the machine, with the 10,000 ohm resistor as bias, it will be found that the plate current will vary with the different positions of the electrode pads with respect to the body of the patient. Plate current can be restored to the correct value (determined by the physician inasmuch as this constitutes the "dosage") by varying the tuning condenser in the output circuit which, in effect, tunes the output circuit to the tank circuit. Should less heat be desired, the plate current can be reduced by further de-tuning of the output circuit. Under normal conditions, the plate current of both tubes will read from a minimum of approximately 125 mils. to a maximum of 250 mils. The data on the construction of the coils (see Fig. 3) for the tank and output circuit will permit this machine to operate in the vicinity of 16 meters. Of course, this frequency is not stable inasmuch as varying loads will cause it to drift somewhat, but this tendency has no effect on the ultimate result—producing heat for the patient.

Finally, every effort must be made to prevent the radiation of interference as much as possible. With this in mind, it will be noticed that the 110 volt A.C. line has been filtered by a series of R.F. chokes and condensers. This effectively prevents R.F. from kicking back into the line. The other type of interference, that radiated by the electrodes and their connecting cable, cannot, of course, be entirely eliminated. *(One of the better ways in which to reduce radiation from the diathermy apparatus is to enclose it, together with physician and patient, in a shield cage made of copper screen, the screen being thoroughly grounded. A double cage, one within the other, with the walls a few inches apart and both grounded, are essential for thorough shielding.*—EDITOR) The metal cabinet and its rack, together with the metal chassis construction, prevents radiation from the tank coil itself.

It is recommended, in constructing this machine, that all the parts specified in the list at the end of this article be adhered to as closely as possible.

Parts List—Diathermy Machine

HAMMARLUND MFG. CO.
1—100 mmf. tuning condenser, 3,000 volts. Type MTC-100-B
4—4-prong Isolantite sockets, Type S-4
2—Short-wave chokes, 500 ma., 2.5 mf. Type CH-50

CORNELL-DUBILIER
1—Fixed mica condenser, .002 mf., 5,000 volts
2—Fixed mica condensers, .002 mf., standard low voltage type
2—Mica transmitting condensers, 100 mmf.
1—Filter condenser, 4 mf., 3,000 volts
2—Mica transmitting condensers, .006 mf.

I.R.C.
1—Wire-wound resistor, 50 watts, 10,000 ohms
1—Wire-wound resistor, 50 watts, 25,000 ohms

TRIPLETT
1—d'Arsonval type meter in bakelite case—300 ma., D.C. (Type 421—with front illumination)

THORDARSON
1—Plate transformer, Type T-19P59
1—Filament transformer, Type T-19F77

PAR-METAL
1—Cabinet, Type DL-2613
2—Panels, Type G-6604
2—Panels, Type G-6601
1—Panel, Type G-6600
(All above finished in slate gray)
2—Chassis, Type 15211
2—Pair of brackets for mounting chassis to panels

BIRNBACH RADIO
1—Roll of No. 10 enameled wire. Type 597
6—Stand-off insulators, No. 966J, and cork washers for same
Several lengths of No. 12 round bus bar wire, Cat. No. 2013
6—Lengths of Cat. No. 300 spaghetti—black
1—12-ft. length black high tension wire
2—Large feed-through insulator jacks and plugs (Pad terminals, see text)

EIMAC
2—Transmitting tubes, Type 100-TS

RAYTHEON
2—Tubes, Type 866

AMPHENOL
2—Type 61-M19 standard plug for below surface mounting, and two female plugs to match (with cable clamps)
2—Chassis connectors, Type 80C female, with companion male plugs (Pad terminals)

AMERICAN RADIO HARDWARE
6—Tie-in strips, Type 1620
4—Banana plugs, type 1150
6—Small battery clips, Type 1561

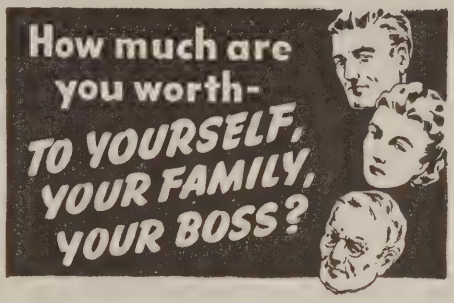
J. W. MILLER
2—R.F. line chokes, Type 7825

CROWE
1—Type 296 dial
1—Type 293 dial

MISCELLANEOUS
1—Set of rubber-wheel casters
1—Set of heavy chrome handles
1—Pilot light, 110 volts, 7 watts, candelabra base
1—Time switch (0 to 30 minutes)
1—Dual time switch (0 to 40 seconds)

The illustrations (and the parts list) show Amphenol pad terminals. These were originally used but were replaced with the Birnbach ceramic terminals during experimentations with wavelengths below 6 meters. For 16-meter work either the Amphenol or Birnback terminals may be used. For work below 10 meters the Birnbach ceramics *must* be used.

RADIO INSTRUCTION



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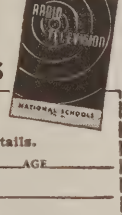

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Practical Metal and Ore Locator

(Continued from page 587)

The construction of the chassis should be done with care. The aluminum shield has a ⅜" hole just under the masonite through which the filament, plate supply, and antenna wires are run. The antenna lead is a 6" piece of hookup wire forming a letter C around the octal 1G6G socket and tied to the front angle braces with cotton cord. The only connection to the antenna is to the trimmer condenser 2 as shown in the diagram. Be sure the prongs to the loop plug (which is an old 4-prong tube base) do not touch any of the parts in the transmitter when plugged into its socket. Arrange the placing of Condensers 1 and 2 so they may be adjusted from the sliding door with a hardwood or bakelite screwdriver. The standard connections for the 4-prong plug-in coil socket are used and the receiver can be tuned with more than one of the sets of four coils that cover 16 to 217 meters (which is correct as the different harmonics are tuned). The push-pull 1G6G transmitter puts out a sharp signal as is natural with this type of circuit.

After the locator has been finished and assembled, put in the tubes, a plug-in coil (try one of the lower frequency coils first), plug in the phones, then turn on the switch. Advance the regeneration control full on, then set padding condenser 1 on the transmitter section about midway; next adjust antenna condenser 2 of the receiver section about one turn open. Then, *very carefully and slowly*, tighten and loosen condenser 1 of the receiver until a very strong audible signal is heard; very slowly adjust until there is found a *dead-spot* (no signal) between the peak audible signals. This spot is very narrow but it is there if the locator has been properly constructed. A piece of metal, when brought into the field of the loop when the null or zero beat of the signal is properly adjusted, will cause a loud signal in the ear phones. The constructor can adjust regeneration control condensers 1 and condenser 2 until maximum results are obtained, which may be easily done with a little experimenting. Place the sliding door in place and the locator is ready for the field. Try on water lines or *known* buried metal objects until accustomed to operation.

Either of the loops shown, used with either of the two larger coils in a set of standard 4-prong, 2-winding plug-in coils, works nicely on the locator.

The Burgess "B" batteries Z30BP and "A" battery 44 were used because of their light weight and adaptability to this very light machine, which weighs well under ten pounds.

Parts List

SOLAR
2—65 to 350 mmf. padding condensers
1—3 to 30 mmf. trimmer condenser
2—.00025 mf. mica condensers
1—.0001 mf. mica condenser
1—.0005 mf. mica condenser
1—.1 mf. tubular condenser

I.R.C.
2—50,000 ohm resistors
1—5 meg. resistor
1—50,000 ohm volume control

HAMMARLUND
1—5½ mh. radio frequency choke
1—2½ mh. radio frequency choke

C. F. CANNON CO.
1—Pr. high "Cannonball" impedance headphones (2000 ohms or higher)

BURGESS
Two Burgess Z30BP 45 volt "B" batteries
One 1½ volt "A" battery

MISCELLANEOUS
1—Toggle switch S.P.S.T.
L1—Loop 2' x 2' 14 turns No. 14 single cotton enamel covered wire
L2—Loop 9" x 9" 30 turns No. 18 D.C.C. Wire both loops center tapped
Tubes—One 1G6G; one 1N5G; two octal sockets; two 4-prong sockets

FEATURES
in the February issue of RADIO-CRAFT

3-Tube Ultra-Compact Deaf-Aid

Selling and Installing "Electric Eye" Equipment

Easily-Built 2-in-1 "Card File" Battery Set

Radically New Miniature Tubes

Build This 1- to 15-Meter 6-Tube Superhet.

Scratch Filter Design

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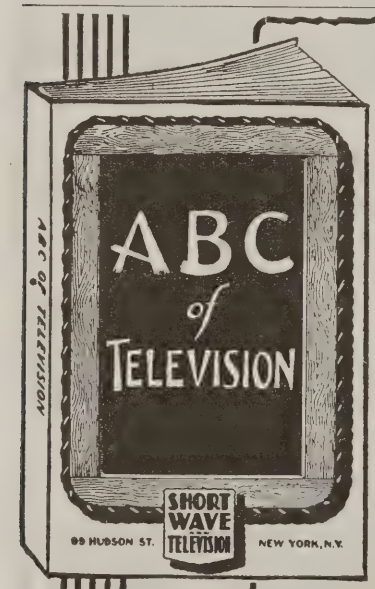

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CHAPTER 3—Need for a large number of picture elements; need for broad channel width in transmission of high-fidelity television signals.
CHAPTER 4—The use of the cathode ray tube in television receivers; necessary associated equipment used in cathode-ray systems.
CHAPTER 5—How a television station looks and how the various parts are operated.
CHAPTER 6—The Iconoscope as used for television transmission in the RCA system.
CHAPTER 7—The Farnsworth system of television transmission.
CHAPTER 8—The future of television; probable cost of receivers; some expressions of opinion by prominent men; list of present television transmitters.

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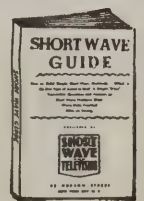

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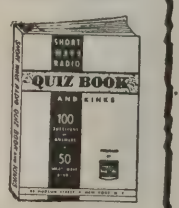


Television Steps Ahead

(Continued from page 581)

cases can be easily and quickly loaded into a couple of ordinary passenger automobiles.

A striking innovation of this new RCA portable television pick-up is a new transmitter working on waves as low as *one meter*, and the unit will operate on an ordinary 110 volt A.C. circuit. The cost of the new pick-up is about one-sixth of the old motor van equipment, and the power consumed is about one-fifth of that used by the old unit. The new pick-up apparatus was recently demonstrated before members of the FCC. RCA has made one of these new units for the New York NBC television station, another for the Tom Lee television station in Los Angeles, and is building a third pick-up unit for CBS.

Regarding the G.E. television station activities at Schenectady, one of the accompanying pictures shows the location of the station with relation to Albany and other cities. Another illustrates the pick-up of a recent Rotary Club dinner during the first public test of W2XB in December.

Voices and images were short-waved from a studio at the General Electric plant to the transmitter high in the Helderberg mountains and then 12 miles back to the Schenectady Rotarians in a downtown hotel, 18 miles to the Troy dinner and 12 miles to the Albany gathering. Though the station operated on one kilowatt, a tenth of its authorized power, the 80-minute program was successfully received at Mount McGregor, 40 miles from the transmitter.

The images were relayed on a 1.4 meter band from the studio, which operates over transmitter W2XH, to the Helderberg transmitter where they were rebroadcast in the 66-72 megacycle band at approximately 4.5 cycles. The Helderberg transmitter is on a 1,500-foot hill, making its antenna 250 feet higher than the one on the Empire State Building in New York.—*H. W. Secor.*

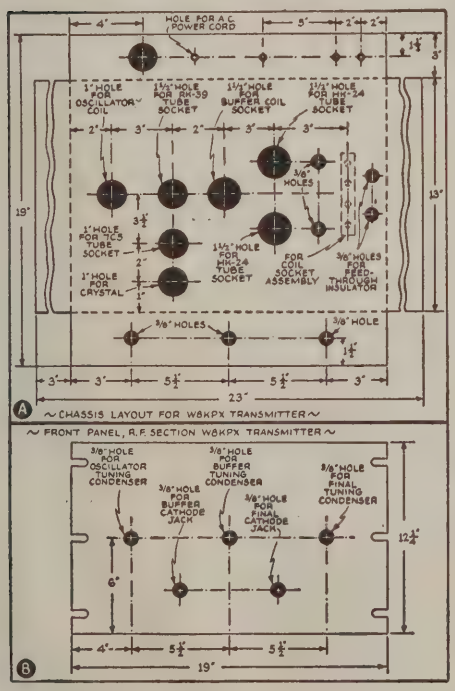
"W8KPX" Cathode-Modulated Transmitter

(Continued from page 590)

plate voltage applied to the R.F. amplifier is also reduced by the amount of the positive potential on the cathode, because this is in opposition to the D.C. plate voltage, reducing the R.F. output still further. When the cathode becomes negative with respect to the ground, the instantaneous plate voltage is increased and the negative grid bias is reduced. This results in an increase in the R.F. output.

The efficiency of a *cathode-modulated* R.F. amplifier ranges from 30 to 60 per cent; the efficiency of a plate-modulated amplifier ranges from 65 to 75 per cent without modulation, while the grid-bias type usually operates at very low efficiencies of 35 per cent or less. For all practical cathode modulation arrangements, the D.C. grid bias and R.F. excitation are set at values intermediate between those of ordinary plate and grid modulation.

Chassis and panel details.


HOLE FOR A.C. POWER CORD
1" HOLE FOR OSCILLATOR COIL
1 1/4" HOLE FOR RK-39 TUBE SOCKET
1 1/4" HOLE FOR BUFFER COIL SOCKET
1 1/4" HOLE FOR HK-24 TUBE SOCKET
3/8" HOLES
1" HOLE FOR TC5 TUBE SOCKET
1" HOLE FOR CRYSTAL
1 1/2" HOLE FOR HK-24 TUBE SOCKET
FOR COIL SOCKET ASSEMBLY
3/16" HOLES FOR FEED-THROUGH INSULATOR
3/8" HOLES
3/8" HOLE
A ~CHASSIS LAYOUT FOR W8KPX TRANSMITTER~
~FRONT PANEL, R.F. SECTION W8KPX TRANSMITTER~
3/8" HOLE FOR OSCILLATOR TUNING CONDENSER
3/8" HOLE FOR BUFFER TUNING CONDENSER
3/8" HOLE FOR FINAL TUNING CONDENSER
3/8" HOLE FOR BUFFER CATHODE JACK
3/8" HOLE FOR FINAL CATHODE JACK
B

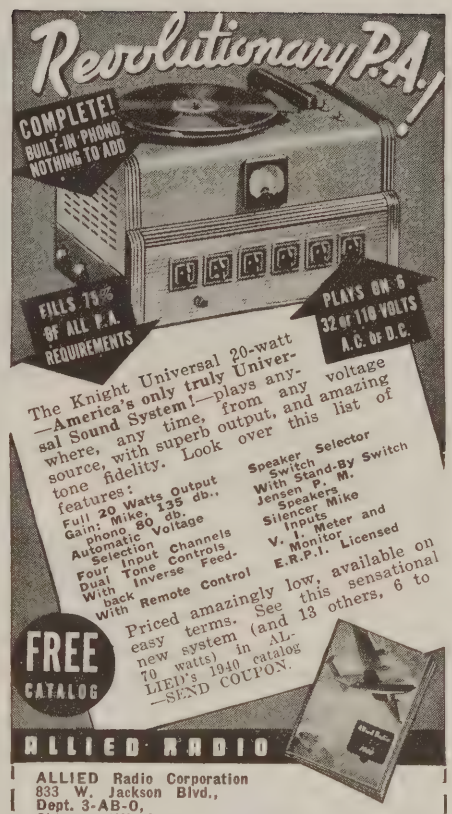
The transmitter to be described in this article is designed especially for the 80, 40, 20 and 10 meter bands. For 160 meter operation, it is necessary to shunt a small fixed capacity across the final plate tank circuit in order to obtain the desired linearity of modulation. Briefly, the R.F. line-up is as follows: A 6V6, 7C5 or 6L6 tritet crystal oscillator, an RK-39 or 807 buffer-doubler and a pair of the new HK-24s in the final. The driving power all the way through, even when doubling in the oscillator and buffer stages, is more than sufficient to drive the little triodes in the final to nearly 100 watts output. The particular arrangement shown is especially fine for 10 and 20 meters and operates quite smoothly on these bands when doubling from a 40-meter crystal. The modulator, which will be described next month, will be constructed entirely from the new "loktal" tube, 7C5s (corresponding to the older type 6V6) being used as modulators.

The construction and adjustment of the transmitter is simplicity itself and, as the R.F. unit has actually been built, tested and all of the "bugs" ironed out, no difficulty should be experienced.

Changes in the layout of the circuit are not recommended. The final amplifier neutralizes perfectly and there are no parasitic oscillations present in either the final or buffer stages; if changes in the layout are made, these desirable conditions may not be obtained so readily. Mount the tuning condensers for all three stages underneath the chassis so that the "hot" leads to the coils and tube sockets will be short and direct. The oscillator and buffer tank condensers are insulated from the chassis by means of the little feed-through isolantite "buttons" now available; insulation of the final tank condenser is not necessary unless more than 1,250 volts is placed on the plates of the HK-24s.

Two power supplies are required for this transmitter, one for the combination of 475 volts and 350 volts for the exciter stages and the speech amplifier, the other a 1,250 volt, 150 milliampere supply for the final R.F. amplifier. The power supply units are shown in the diagrams, together with all their component values. Photographs showing the construction of the power supplies

(Turn the page please)



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Silencer Mike Inputs
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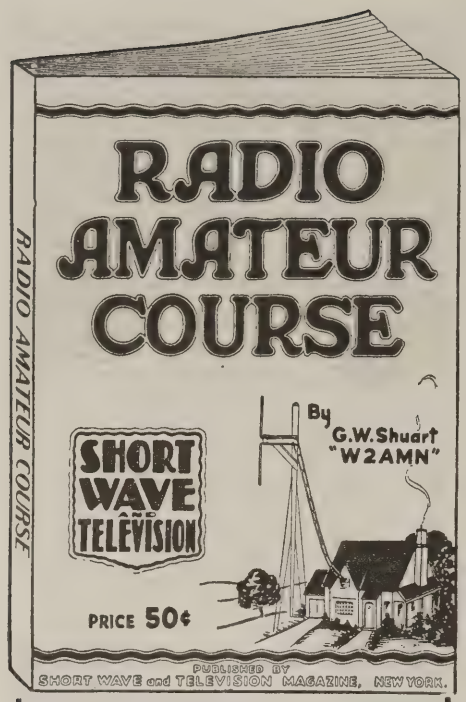

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"W8KPX" Cathode-Modulated Transmitter

(Continued from preceding page)

and the modulator will appear in next month's article.

For operation on 160 meters, the cathode condenser in the oscillator circuit, if the tritet oscillator is used, should be rotated to the position where the plates are short-circuited, permitting the crystal stage to work "straight through". Tune the plate circuits of the oscillator and the buffer to the frequency of the crystal. The oscillator plate current will run about 25 to 40 milliamperes at 350 volts; the buffer plate and screen current should be somewhere around 60 to 80 milliamperes when properly tuned and driving the HK-24s. Tune up the oscillator and buffer stages and make certain that these are operating properly before making any attempt to apply power to or tune up the final amplifier. Tune up the final amplifier and neutralize it in the usual manner. It is best to neutralize the final in the 10 or 20 meter bands because the point of perfect neutralization is more easily determined in the high frequency region. When tuning the final amplifier, the antenna coupling should be adjusted to provide a cathode current of from 100 to 125 milliamperes with 15 to 20 milliamperes of grid current. It is best, if one is available, to use a cathode ray oscillograph for the final bias and antenna loading adjustments; if the oscillograph can not be obtained, however, good results should be obtained by adjusting to the values as given above.

In the concluding article the constructional details of the modulator and power supplies will be given, together with the actual operating data on the completed transmitter. No doubt many hams will be interested to learn that the author has available a number of large blue prints on this transmitter which will be distributed *free of charge* as long as the supply lasts. To obtain one, send *a large stamped and self-addressed envelope* to the author in care of RADIO & TELEVISION.

Part 2—Describing the "Modulator and the Two Power Supplies," will appear in the next issue.

Parts for "W8KPX" Transmitter

JAMES MILLEN MFG. CO.
1—Transmitting variable condenser, 70 mmf., .077" spacing per section. Type 13070.
2—Nickel silver instrument dials, 3½" diameter. Type 10008.
4—Midget R.F. chokes, 2.5 millihenry, 125 ma. Type 34100.
1—Transmitting R.F. choke, 2.5 millihenry, 500 ma. Type 34140.
1—Midget nickel silver dial, 1⅝" diameter. Type 10007.

HAMMARLUND
2—Disc type neutralizing condensers, 1-10 mmf.
1—Power tube shield (for RK-39)
3—Pairs small feed-through insulating buttons.
1—Isolantite socket, 5-prongs (for RK-39).
2—Isolantite sockets, 4-prongs (for HK-24s).
1—Two-section tuning condenser, receiving type. 100 mmf. per sec.
2—Mica padding condensers, 70 mmf. max. capacity each.

BUD RADIO
1—Transmitting condenser, 110 mmf. type JC-1526.
1—Steel chassis, black crackle finish, 10x17x3 inches.
1—Steel panel, black crackle finish, 19x12¼ inches.
2—Steel brackets, black crackle finish, small size.
2—Closed circuit jacks.
2—Insulated flexible couplers for ¼" condenser shafts.
1—Set "500 watt" transmitting coils with mounting base.
1—Set "buffer" coils, 5-prong base.

BLILEY
1—LD2 or B5 crystal and holder.

CORNELL-DUBILIER
4—2,000 mmf., 2,500 volt mica transmitting condensers. Type 4-25D2.
1—0.5 mf., 400 volt paper condenser. Type RM-4050.

I.R.C.
1—Wire-wound resistor, 10 watts, 400 ohms.
2—Wire-wound resistors, 10 watts, 15,000 ohms.
1—Wire-wound resistor, 10 watts, 800 ohms.
1—Wire-wound resistor, 10 watts, 200 ohms.
1—Wire-wound resistor, 10 watts, 25,000 ohms with slider.
2—Metallized resistors, 1 watt, 100,000 ohms.
1—Metallized resistor, 1 watt, 50,000 ohms.

KENYON
1—Cathode-drive modulation transformer, for p.p. 2A3's or 6V6's.

RAYTHEON
1—6L6, 6V6 or 7C5 tube (oscillator).
1—RK-39 transmitting tube.

HEINTZ AND KAUFMAN
2—HK-24 "Gammatron" transmitting tubes.

2-Tube "Overseas DX-er"

(Continued from page 585)

ment switch you are able to hear your war news *direct.* Turn the regeneration control condenser either clockwise or counter-clockwise until the familiar rushing sound of regeneration is heard. Then tighten or loosen the antenna trimmer condenser knob until oscillation over the entire 16 to 32 meter range is obtained. This procedure will have to be followed every time a new plug-in coil is inserted. However once the best position for the antenna trimmer is obtained it need not be altered unless the plug-in coil is changed. If the above instructions are carefully followed you have a nifty little job which you will use frequently and with great pleasure.

Parts List

HAMMARLUND MFG. CO.
2—140 mmf. variable condensers
1—2.5 mh. R.F. choke
1—35 mmf. antenna trimmer condenser

CORNELL-DUBILIER
1—0.006 mf. fixed paper condenser
1—0.001 mf. mica condenser
1—0.01 mf. coupling condenser
2—0.1 mf. fixed paper condensers

I.R.C.
1—3 meg. grid-leak resistor, ¼ w.
1—0.25 meg., ¼ w. resistor
1—0.5 meg., ¼ w. resistor

R.C.A.
1—Type 1T4 tube (R.F. pentode)
1—Type 1S4 tube (power pentode)

C. F. CANNON CO.
1—Pair "Cannonball' headphones

CINCH MFG. CO.
2—Wafer-type 7-pin sockets for new RCA Lilliputian tubes

NATIONAL CARBON CO.
1—Eveready 45 V. "B" battery with 22½ V. tap, portable type
1—Eveready flashlight cell, standard type

MISCELLANEOUS
1—4-prong coil socket
1—Set of plug-in coils, home-made as per coil data
1—Sheet of 1/16" aluminum, 5" x 6"
1—4" x 6" card file case, obtainable from 10c store
1—Filament "on-off" toggle switch
3—Pen flashlight cells from 10c store
Miscellaneous hardware, wire, tip jacks, etc.

World S-W Stations

(Continued from page 598)

Mc.	Call	
15.270	HI3X	CIUDAD TRUJILLO, D. R., 19.65 m. Relays HIX Sun. 7.40-9.40 am. Tues. and Fri. 8.10-10.10 pm.
15.270	WCAB	PHILA., PA., 19.65 m. (Addr. See 21.52 mc.) 4-6 pm. exc. Sat. and Sun. Sat. 12 n.-6 pm., Sun. 3-6 pm.
15.260	GSI	DAVENTRY, ENG., 19.66 m., Addr. (See 17.79 mc.) 12.57-5 am., 11.52 am.-1.30 pm.
15.250	WRUL	BOSTON, MASS., 19.67 m., Addr. University Club. Daily exc. Sat. and Sun. 10 am.-11 am. to Europe.
15.245	TPA2	PARIS, FRANCE, 19.68 m., Addr. 98 Bis. Blvd. Haussmann. "Paris Mondial" 5-10 am. only.
15.240	2RO14	ROME, ITALY, 19.68 m. Irregular.
15.240	YUG-YUF	BELGRADE, YUGOSLAVIA. 19.68 m., 7-9.05 pm. to N. America.
15.240	CR7BD	LOURENCO MARQUES, MOZAMBIQUE. 19.68 m. 4.30-6.30, 9.30-11 am., noon-4 pm.
15.230	HS6PJ	BANGKOK, SIAM, 19.7 m. Irregularly Mon. 8-10 am.
15.220	PCJ2	HUIZEN, HOLLAND, 19.71 m., Addr. N. V. Philips' Radio Hilversum. 7.40-8.45 am. (Sun., Mon., Thur. to 9 am.), Tue. 1-2.30 am., Wed. 9.30-11 am.
15.210	WPIT	PITTSBURGH, PA., 19.72 m., Addr. (See 21.540 mc.) 8 am.-3 pm.
15.200	DJB	BERLIN, GERMANY, 19.74 m., Addr. (See 15.280 mc.) 12.05-7, 8-11 am. Also Sun. 11.10 am.-12.25 pm. News 7.45, 8.30 am.
15.200	XGOX	SZECHUAN, CHINA. 19.74 m. 9-10.45 am. to N. A.
15.190	OIE	LAHTI, FINLAND. 19.75 m. Addr. (See OFD, 9.5 mc). 1:05-4 am, 9 am.-5 pm.
15.190	ZBW4	HONGKONG, CHINA, 19.75 m., Addr. P. O. Box 200. Irregular. 11.30 pm. to 1.15 am., 3-10 am.
15.180	GSO	DAVENTRY, ENG., 19.76 m., Addr. (See 17.79 mc.) 5.42-11.30 am. to Europe.
15.180	RV96	MOSCOW, U.S.S.R., 19.76 m., 3-3.45 am. (Eng.) to No. Am.
15.170	TGWA	GUATEMALA CITY, GUAT., 19.77 m., Addr. Ministre de Fomento. Daily 12.45-1.45 pm.; Sun. 1.45-5.15 pm.
15.166	LKV	OSLO, NORWAY, 19.78 m. 6.40 am.-5 pm.
15.160	JZK	TOKYO, JAPAN, 19.79 m. 4.30-5.30, 8-9 pm. to N. A. News at 8.15 pm.
15.160	XEWW	MEXICO CITY, MEXICO, 19.79 m., 12 n.-12 m., irregular.
15.155	SBT	MOTALA, SWEDEN, 19.80 m. 1-4.30 pm. Wed., Sats. 8-9 pm.
15.150	YDC	BANDOENG, JAVA, 19.8 m., Addr. N. I. R. O. M. 6-9 pm. ex. Sat., 10.30 pm.-2 am., Sat. 7.30 pm.-2 am., daily 4.30-10.30 am.
15.140	GSF	DAVENTRY, ENG., 19.82 m., Addr. (See 17.79 mc.) 3.30-5, 9-11.45 am., 3.50-6 pm.
15.135	JLU3	TOKYO, JAPAN, 19.82 m., 8-9.30 am. to China. Irregular.
15.130	WRUW-WRUL	BOSTON, MASS., 19.83 m., Addr. World-Wide B'cast'g Foundation. University Club. Mon.-Fri. 3-5, 8-11.30 pm.; Sat. 1.45-5.30 pm.; Sun. 10 am.-12 n.
15.130	TPB6	PARIS, FRANCE. 19.83 m., Addr. "Paris Mondial," 98 Bis Blvd. Haussmann, 1-4 am.
15.120	HVJ	VATICAN CITY, 19.84 m. Tues. 10.30-11 am., Suns. 1-1.30 pm. to No. Am. Wed. 2.30-3 pm.
15.120	CSW4	LISBON, PORTUGAL, 19.84 m., 7-9 am.
15.120	SPI9 *	WARSAW, POLAND, 19.84 m.
15.110	DJL	BERLIN, GERMANY, 19.85 m., Addr. (See 15.280 mc.) 12.05-2 am., 4.55-8 pm. to N. A. News, 6 pm. 10.40 am.-4.25 pm to Arica.
15.100	CBI510	VALPARAISO, CHILE. 19.87 m. Testing near 7.30 am.
15.100	2RO12	ROME, ITALY. 19.87 m. Irreg. 4-5.30, 6-7.25, 7.30-9 pm.
15.040	RKI	MOSCOW, U.S.S.R., 19.95 m. Works Tashkent near 7 am. Broadcasts in English. Daily 7-8 pm. 8-9 pm. to N. A.

End of Broadcast Band

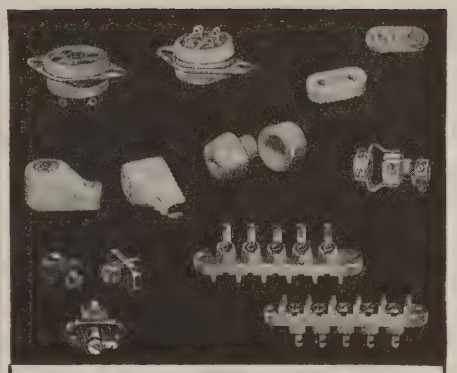
* Operation uncertain.

Mc.	Call	
14.960	RZZ	MOSCOW, U.S.S.R., 20.05 m. Irregular.
14.940	PSE	RIO DE JANEIRO, BRAZIL. 20.08 m. Broadcasts 6-7 pm., Wed. 4-4.10 pm., Thurs. 3-3.30 pm.
14.920	KQH	KAHUKU, HAWAII, 20.11 m. Sats. 8.30-9 pm. Sun. 9-9.30 pm.
14.795	IQA	ROME, ITALY, 20.28 m. 4.30-5 am. In Arabic.
14.600	JVH	NAZAKI, JAPAN, 20.55 m. Works Europe 4-8 am. Rel. JOAK Irr. after midnight.
14.535	HBJ	GENEVA, SWITZERLAND, 20.64 m. Addr. Radio Nations. Broadcasts Wed. 6.45-8.15; 8.40-10.15 pm. to No. Am. News in English 9.30-9.35 pm.
14.460	DZH	BERLIN, GERMANY. 7-10.50 pm. almost daily.
14.440	—	RADIO MALAGA, SPAIN, 20.78 m. Relays Salamanca 5.45-7.30 pm. Sometimes 2-4 pm.
14.420	HCIJB	QUITO, ECUADOR, 20.80 m. 7-8.15, 11.30 am.-2.30, 4.45 pm.-10.15 pm. Exc. Mon.
14.166	PIIJ	DORDRECHT, HOLLAND, 21.15 m., Addr. (See 7.088 mc.) Sat. 12 n.-12.30 pm.
13.997	EA9AH	TETUAN, SPANISH MOROCCO, 21.43 m. Apartado 124. 5.15-6.15 pm., 6.30-7.30 pm., 9-10 pm. Relays Salamanca from 5.40 pm.
13.900	YNDG	LEON, NICARAGUA, 21.58 m. Sun. 12.30-1, or 1.30 am.
13.635	SPW *	WARSAW, POLAND, 22 m.
12.862	W9XDH	ELGIN, ILL., 23.32 m. Press Wireless, Tests 2-5 pm.
12.486	HI1N	TRUJILLO CITY, DOM. REP., 24.03 m. 6.40-10.40 am., 5.10-10.40 pm.
12.460	HCJB	QUITO, ECUADOR, 24.08 m. Daily exc. Mon. 7-8.15, 11.30 am.-2.30, 5-10.30 pm.
12.310	VOFB	ST. JOHNS, NEWFOUNDLAND. 24.37 m. 5.30-7.30 pm.
12.235	TFJ	REYKJAVIK, ICELAND, 24.52 m. Sun. 1.30-2.30 pm.
12.230	COCE	HAVANA, CUBA, 24.53 m.-8 am.-11.30 pm. Sun. noon-11.30 pm.
12.200	——	TRUJILLO, PERU, 24.59 m., "Rancho Grande." Address Hacienda Chiclin. Irregular.
12.000	RNE	MOSCOW, U.S.S.R., 25 m. 7-9 pm. to N.A. Freq. breaks, 9 pm.-5 am., 9-11 am.
11.970	CBI180	SANTIAGO, CHILE, 25.06 m. 7-11 pm.
11.970	HI2X	CIUDAD TRUJILLO, D. R., 25.07 m., Addr. La Voz de Hispaniola. Relays HIX Tue. and Fri. 8.10-10.10 pm. Sun. 7.40-9.40 am.

25 Met. Broadcast Band

11.940	TI2XD	SAN JOSE, COSTA RICA, 25.13 m. La Voz del Pilot. Apartado 1729. 7.30 am.-noon, 4-10 pm.
11.910	CDI190	VALDIVIA, CHILE, 25.19 m., P. O. Box 642. Relays CB69 10 am.-1 pm., 3-6, 7-10 pm.
11.910	—	HANOI, FRENCH INDO-CHINA. 25.19 m. "Radio Hanoi", Addr. Radio Club de l'Indochine. 3.45-4.15 am., 7-9.30 am., 150 watts.
11.900	XGOY	SZECHWAN, CHINA. 25.21 m. 5.30-7.35, 7.40-11, 11.10-11.50 am., 2-4.20, 4.30-6.20 pm. News 6.15-9 am.
11.900	XEWI	MEXICO CITY, MEXICO, 25.21 m., Addr. P. O. Box 2874. Mon., Wed., Fri. 3-4 pm., 9 pm.-12 m. Tues. and Thur. 7.30 pm.-12 m., Sat. 9 pm.-12 m., Sun. 12.30-2 pm.
11.895	2RO13	ROME, ITALY. 25.23 m. Irregular 6-9 pm.
11.890	VLR3	MELBOURNE, AUSTRALIA. 25.23 m. 3.30 pm.-12.30 am.
11.885	TPB	PARIS, FRANCE, 25.24 m. (See 15.245 mc.) 1-4, 10.15 am.-5.45, 6-7.45, 8 pm.-12.30 am. to N. A. News, 8.03, 11.30 pm., 12.15 am.
11.870	WPIT	PITTSBURGH, PA., 25.26 m., Addr. (See 21.540 mc.) 3-11 pm.
11.870	VUM2	MADRAS, INDIA, 25.26 m. M.W.F. 3.30-4 am.

(Continued on following page)



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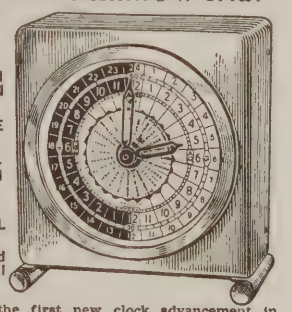

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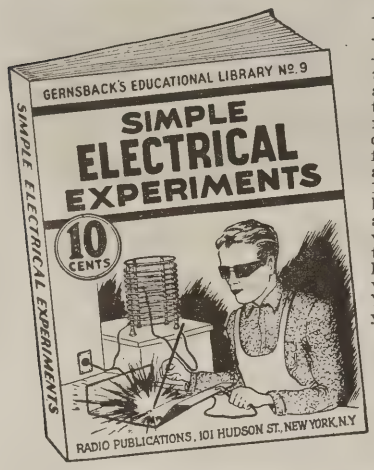
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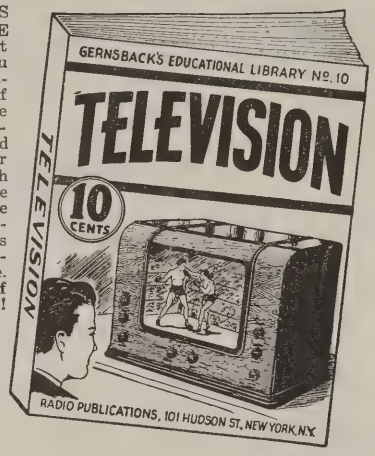

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11.860	GSE	DAVENTRY, ENG., 25.30 m., Addr. (See 11.75 mc.) 3.30-5, 9-11.45 am., 1.45-3.30, 6.22-9.15 pm.
11.855	XMHA	SHANGHAI, CHINA. 25.31 m. Wkdys 11 pm.-1 am., 5-11 am. Suns. 10 pm.-11 am.
11.855	DJP	BERLIN, GERMANY, 25.31 m., Addr. (See 15.200 mc.) 12.05-2 am., 4.50-10.50 pm.
11.850	HAD	BUDAPEST, HUNGARY, 25.32 m. 3-6 pm. to S. A.
11.850	CB1185	SANTIAGO, CHILE, 25.32 m. Sat. 6-11 pm. and irreg.
11.850	OAX2A	TRUJILLO, PERU, 25.32 m. Testing on this freq. (See 12.200).
11.845	TPB	PARIS, FRANCE, 12.30-1 pm. to N. A. 2.30-5.45 pm.
11.840	OLR4A	PRAGUE, BOHEMIA, 25.35 m., Addr. Czech Shortwave Sta., Praha XII, Fochova 16. Daily 6.55-10.15 pm. to No. Am.
11.840	KZRM	MANILA, P. I., 25.35 m. Addr. Erlanger & Gallinger, Box 283. 9 pm.-10 am. Irregular.
11.840	CSW	LISBON, PORT., 25.35 m. Nat'l Broad. Station. 11.30 am.-1.30 pm. Irregular.
11.830	WCBI	CHICAGO, ILL., 25.36 m., Addr. Chicago Federation of Labor. Irregular 7 am.-6 pm.
11.830	WCBX	NEW YORK CITY, 25.34 m., Addr. Col. Broad. System, 485 Madison Av., N.Y.C. Daily exc. Sat. and Sun. 4-6 pm.; Sun. 3-6 pm. to Europe; Sat. 1-6 pm. Daily 6.30-10 pm. to S. A.
11.826	XEBR	HERMOSILLA, SON., MEX., 25.37 m., Addr. Box 68. Relays XEBH. 9-11 am., 8-10.30 pm.
11.810	2RO4	ROME, ITALY, 25.4 m., Addr. E.I.A.R., Via Montello 5. Daily 4.30 am.-3 pm., 6-7.25, 7.30-9 pm. to N.A. News, 7.30 pm.
11.805	OZG	SKAMLEBAK, DENMARK, 25.41 m. Addr. Statsradiofonien. Irreg.
11.801	DJZ	BERLIN, GERMANY, 25.42 m. Addr. See 15.280 mc. 4.50-10.50 pm. To No. America. Irregular.
11.800	JZJ	TOKYO, JAPAN, 25.42 m., Addr. Broadcasting Co. of Japan, Overseas Division 7-9.30 am., 2-4, 4.30-5.30 pm.
11.800	COGF	MATANZAS, CUBA, 25.42 m., Addr. Gen. Betancourt 51. Relays CMGF. 6 am.-9 pm.
11.800	XGOK	CANTON, CHINA. 25.42 m. 6-8.35 am.
11.795	DJO	BERLIN, GERMANY, 25.42 m. Addr. (See 15.280 mc.) Irreg.
11.790	WRUL	BOSTON, MASS., 25.45 m., Addr. (See 15.130 mc.) Sun. 10 am.-12 n.; Mon.-Fri. 3-5 pm.; Sat. 1.45-5.30 pm.
11.780	OFE	LAHTI, FINLAND. 25.47 m. Addr. (See OFD, 9.5 mc.) 1.15 am-12.05 pm.
11.780	—	SAIGON, INDO-CHINA. 25.47 m. 6-6.45 am. in Eng., 6.45-11 am., 11.45 pm.-12.45 am.
11.780	——	LUXEMBURG, LUXEMBURG, 25.47 m. Radio Luxemburg. Heard 8.30-10 pm.
11.780	HP5G	PANAMA CITY, PAN., 25.47 m., Addr. Box 1121. Noon-1 pm., 6-10 pm.
11.775	MTCY	HSINGKING, MANCHUKUO, 25.48 m. Addr. Central Broadcasting Station. 1.30-2.30 to No. Am. 9.50-10.50 am., 4-4.50 pm.
11.770	DJD	BERLIN, GERMANY, 25.49 m., Addr. (See 15.280 mc.) 11.30 am.-4.25 pm., 4.50-10.50 pm. to N. A.
11.760	2RO15	ROME, ITALY, 25.51 m. 3-5 am., 10 am.-n. irreg.
11.760	TGWA	GUATEMALA CITY, GUAT., 25.51 m. (See 17.8 mc.) Irregular 10-11.30 pm. Sun. 6-11.30 pm., irregular.
11.760	XETA	MONTEREY, MEX. 25.51 m., Addr. Box 203. Relays XET, n.-3.30 pm. and evenings.
11.760	OLR4B	PRAGUE, BOHEMIA, 25.51 m. Addr. (See 11.840 mc.) Daily exc. Sun. 8.25-10.05 am.
11.750	GSD	DAVENTRY, ENG., 25.53 m., Addr. B.B.C., London, 12.57-5.15 am.
11.740	SP25 *	WARSAW, POLAND, 25.55 m.
11.740	HVJ	VATICAN CITY, 25.55 m. Tues. 8.30-9 am.
11.740	CR6RC	LOANDA, ANGOLA, 25.55 m., 6.30-7.45 am. Tues., Wed., Sat., 3.30-5 pm., Sun. 9.30 am.-1 pm.

Mc.	Call	
11.735	COCX	HAVANA, CUBA. 25.57 m. P. O. Box 32. Daily 8 am.-12 m. Sun. 8 am.-1 am. Relays CMX.
11.735	LKQ	OSLO, NORWAY, 25.57 m. 4.30-6.40 am., Sun. 2.30-6.40 am.
11.735	YUE	BELGRADE, YUGOSLAVIA, 25.57 m. 7-9.05 pm. to N. A. irreg.
11.730	PHI	HUIZEN, HOLLAND, 25.57 m., Addr. N. V. Philips' Radio.
11.730	WRUW-WRUL	BOSTON, MASS., 25.58 m., Addr. World-Wide B'cast'g Foundation, University Club. Sun. 2-7 pm.; Mon.-Fri. 5.30-7.30, 8-11.30 pm. Sat. 6-7.30 pm.
11.725	JVW3	TOKYO, JAPAN, 25.57 m. 1.15-2.20 am.
11.720	CJRX	WINNIPEG, CANADA, 25.6 m., Addr. James Richardson & Sons, Ltd. Daily 6 pm.-12 m., Sat. 6 pm.-Sun. 4 am.
11.720	ZP14	VILLARICA, PARAGUAY, 25.60 m. Mon. to Fri. 5-8 pm., Sat.-Sun. 11 am.-6 pm.
11.718	CR7BH	LAURENCO MARQUES, PORTUGUESE E. AFRICA, 25.6 m. Daily 12.05-1, 4.30-6.30, 9.30-11 am., 12.05-4 pm., Sun. 4-7 am., 10 am.-2 pm.
11.718	TPA4	PARIS, FRANCE, 25.60 m. (See 15.245 mc.) 6-7.45, 8 pm.-12.30 am. to No. America.
11.710	YSM	SAN SALVADOR, EL SALVADOR, 25.62 m., Addr. (See 7.894 mc.) 1-2.30 pm.
11.710	—	SAIGON, FRENCH INDO-CHINA. 25.62 m., Addr. Boy-Landry, 17 Place A Foray. 7.30-9.45 am.
11.705	SBP	MOTALA, SWEDEN, 25.63 m., 1-4.30 pm. Sun. 3 am.-4.30 pm. Wed. and Sat. 8-9 pm. to N. A.
11.700	HP5A	PANAMA CITY, PAN., 25.64 m. Addr. Radio Teatro, Apartado 954. 10 am.-1 pm., 5-10 pm. Sun. 6-10 pm. 7-8.30 am. 7-8.30 am. sked. in daily prog.
11.700	CB1170	SANTIAGO, CHILE, 25.65 m. Addr. P.O. Box 706. Relays CB89 10 am.-2 pm., 3.30-11 pm.

End of Broadcast Band

11.676	IQY	ROME, ITALY. 25.7 m. 5.20-5.40 am. ex. Sun., Daily 12.07-12.56, 1.50-3.30 pm. 7.30-9 pm. to N. A.
11.535	SPD *	WARSAW, POLAND, 26.01 m., Addr. 5 Mazowiecka St. 6-9 pm.
11.402	HBO	GENEVA, SWITZERLAND, 26.31 m., Addr. Radio Nations. 1st Sun of mo. 12.45-2.30 am., 1.45-2.30 pm. Tues. 12.45-2.45 pm., Fri. 8.45-10.45 pm.
11.040	CSW5	LISBON, PORTUGAL, 27.17 m., Addr. Nat. Broad. Sta. 12-3.30 pm. Sun. 10 am.-3.30 pm.
11.000	PLP	BANDOENG, JAVA, 27.27 m. Relays YDB. 6-9 pm., 10.30 pm.-2 am., 4.30-10.30 or 11 am. Sat. until 11.30 am.
10.950	FIQA	TANANARIVE, MADAGASCAR, 27.40 m., Addr. (See 9.38 mc.) 12.30-45, 10-11 am., 2.30-4 am.,
10.670	CEC	SANTIAGO, CHILE, 28.12 m. Irregular.
10.660	JVN	NAZAKI, JAPAN, 28.14 m. Broadcasts daily 1.50-7.40 am. Works Europe irregularly at other times.
10.600	ZIK2	BELIZE, BR. HONDURAS, 28.30 m Tues., Thurs., Sat. 1.30-2, 8.30-9 pm.
10.535	JIB	TAIHOKU, TAIWAN, 28.48 m. Works Japan around 6.25 am. Broadcasts, relaying JFAK 9-9.55 am., 4-5 am. irreg.
10.400	YSP	SAN SALVADOR, EL SALVADOR, 28.85 m., 1-3, 6.30-11 pm.
10.360	EAJ43	TENERIFE, CANARY ISL., 28.96 m., 3-4.30, 5-7, 7.45-8.45, 9-10 pm.
10.350	LSX	BUENOS AIRES, ARG., 28.98 m., Addr. Transradio International. Tests irregularly.
10.330	ORK	RUYSSELEDE, BELGIUM, 29.04 m. Broadcasts 1.30-3 pm. To Belgian Congo. Works OPM 1-3 am., 3-5 pm.
10.290	DZC	BERLIN, GERMANY, 29.15 m. 6.30.9 pm. to Brazil.
10.260	PMN	BANDOENG, JAVA, 29.24 m. Relays YDB 6-9 pm., 10.30 pm.- 2 am., 4.30-10.30 or 11 am., Sat. to 11.30 am.
10.220	PSH	RIO DE JANEIRO, BRAZIL, 29.35 m., Addr. Box 709. Broadcasts 6-7 pm., Mon. 8-8.30 pm. to N. A. Fri. 7-7.30 pm.
10.100	——	DEUTSCHE FREIHEITS SENDER, 29.70 m., loc. in Germany, undercover. 4-5 pm.
10.065	TIEM	SAN JOSE, COSTA RICA. 29.81 m., 4.30-8 pm.
9.985	COBC	HAVANA, CUBA, 30.05 m. Addr. P. O. Box 132. Relays CMBC 6 am.-12 mid.
9.925	JDY	DAIREN, MANCHUKUO, 30.23 m. Relays JOAK daily 7-8 am. Works Tokyo occasionally in early am.
9.892	CPI	SUCRE, BOLIVIA, 30.33 m., 11 am.-n., 7-9 pm.
9.870	FIQA	TANANARIVE, MADAGASCAR. 30.40 m. (See 10.950 mc.)
9.855	EAQ	MADRID, SPAIN, 30.45 m., Addr. P. O. Box 951. 6-7.30, 7.45-8.30 pm. to No. Am.
9.830	IRF	ROME, ITALY, 30.52 m. Works Egypt afternoons. Relays 2RO, 5.20-5.40 am., 12-12.25 pm. Daily 1.50-2.30, 6-9 pm. to N. A.
9.815	COCM	HAVANA, CUBA, 30.57 m. Addr. Transradio Columbia, P. O. Box 33. 8 am.-12.30 am. Relays CMCM.
9.78	HH3W	PORT-AU-PRINCE, HAITI, 30.67 m. Addr. P. O. Box A117. 1-2, 7-9.15 pm.
9.755	ZRO	DURBAN, SOUTH AFRICA, 30.75 m. Addr. S. A. Broadcasting Corp., P. O. Box 4559, Johannesburg. Daily exc. Sat. 11.45 pm.-12.50 am. Daily exc. Sun. 3.30-7.30 am., 9-11.15 am. Sun. 5.30-7, 7-11.15 am.
9.750	HJ6FAH	ARMENIA, COLOMBIA, 30.77 m. 8-10.30 am., 5-10.30 pm.
9.740	CB974	VALPARAISO, CHILE, 30.80 m., 7 am.-11.30 pm. irreg.
9.740	CSW7	LISBON, PORTUGAL. 30.80 m. Addr. Nat. Broad. Sta. 4-6, 6.15-9 pm. for No. Amer.
9.720	——	FORT DE FRANCE, MARTINIQUE, 30.86 m. Addr. P. O. Box 136. 6-8.10 pm. Irr. to 9.30 pm.
9.708	COCQ	HAVANA, CUBA, 30.90 m. Addr. 25 No. 445, Vedado, Havana, 7-1 am. Sun. 6.55 am.-1 am.

31 Met. Broadcast Band

9.705	HJCF	BOGOTA, COLOMBIA, 30.92 m. Eves. to 9, irreg. to 11 pm.
9.695	JIE3	TYUREKI, TAIWAN, 30.95 m. 9.05-10.20 am.
9.690	—	TANANARIVE, MADAGASCAR, 30.96 m., 12.30-12.45, 3.30-4.30, 10-11 am., Sun 2.30-4 am.
9.690	ZHP	SINGAPORE, MALAYA, 30.96 m. Sun. 5.40-9.40 am., Wed. 12.40-1.40 am., Mon.-Fri. 4.40-9.40 am., Sat. 12.25-1.40 am., 4.40-9.40 am., 10.40 pm.-1.10 am. (Sun.)
9.690	GRX	DAVENTRY, ENGLAND, 30.96 m., Addr. See GSC, 9.58 mc. 12.57-5.15 am., 11.52 am.-8 pm. to Europe.
9.690	TI4NRH	HEREDIA, COSTA RICA, 30.96 m., Addr. Amando C. Marin, Apartado 40. Tue., Th., Sat. 9-10 pm. Sun. 7-8 am.
9.690	LRA1	BUENOS AIRES, ARG., 30.96 m., 10.30 am.-1, 4.30-9 pm. Sat. and Sun. 7-9 pm.
9.685	TGWA	GUATEMALA CITY, GUAT., 30.96 m. Daily 10-11.30 pm.; Sun. 7-12 pm.
9.683	HNF	BAGHDAD, IRAQ. 30.98 m. 6 am.-3 pm.
9.680	XEQQ	MEXICO, D.F., MEXICO, 30.99 m. 5 pm.-1 am.
9.680	TPB	PARIS, FRANCE, 30.99 m. "Paris Mondial" 8 pm.-12.30 am. to No. Am. News, 8, 11.30 pm., 12.30 am.
9.675	——	SAIGON, INDO-CHINA, 31.01 m., Addr. 17, Place A. Foray. "Radio Boy-Landry." 7.30-9.45 am. Irreg.
9.675	DJX	BERLIN, GERMANY, 31.01 m., Addr. (DJD, 11.77 mc.) 10.40 am.-4.25 pm. To Africa.
9.670	WRCA	BOUND BROOK, N. J., 31.03 m. Addr. NBC, N. Y. C. 4 pm.-1 am.
9.665	2RO9	ROME, ITALY. 31.04 m. 12.40 to 5.30 pm., 6-6.30 pm.
9.660	LRX	BUENOS AIRES, ARG., 31.06 m., Addr. El Mundo. Relays LR1. 6-6.45 am.-9.15 am.-10 pm.
9.660	HVJ	VATICAN CITY, 31.06 m. Sun. 5-5.30 am.
9.650	WCBX	NEW YORK CITY, 31.09 m. (See 21.570 mc. for addr.) 10.30-11.30 pm. to Latin Amer.

(Continued on following page)

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(Continued from preceding page)

Mc.	Call	
9.650	CS2WA	LISBON, PORTUGAL, 31.09 m., Addr. Radio Colonial. Tues., Thurs. and Sat. 4-7 pm.
9.650	I2AA	ADDIS ABABA, ETHIOPIA, 31.09 m., 3.30-5.30 am., 11 am.-2.30 pm.
9.645	JLT2	TOKYO, JAPAN, 31.10 m.
9.640	CXA8	COLONIA, URUGUAY, 31.12 m., Addr. Belgrano 1841, Buenos Aires, Argentina. Relays LR3, Buenos Aires 5 am.-10.45 pm. Sat. to 1 am.
9.635	KZRH	MANILA, PHILIPPINES, 31.14 m. 6-11.30 am.
9.635	2RO3	ROME, ITALY, 31.13 m., Addr. (See 11.810 mc.) 12.07-3 pm., 5.30-9 pm. to No. Am. News at 7.30 pm.
9.630	CXA6	MONTEVIDEO, URUGUAY, 31.15 m. 10.30 am.-12.30, 3.30-9.30 pm.
9.630	JFO	TAIHOKU, TAIWAN, 31.15 m. Relays JFAK. 4-10.30 am.
9.625	HAD	BUDAPEST, HUNGARY, 31.19 m. 6-9 pm. to N. A.
9.625	TIPG	SAN JOSE, COSTA RICA, 31.19 m. 7-9.30 am., 12-2, 8-11.30 pm.
9.610	LLG	OSLO, NORWAY, 31.22 m., 3-6, 8-9, 11 pm.-mid.
9.610	DXB	BERLIN, GERMANY, 31.22 m. 2.15-2.30, 4.15-4.30, 4.55-10.50 pm. to N. A. 11 pm.-1 am. News at 4.15, 6, 8.15, 10.30 pm. to No. Am.
9.606	ZRL	KLIPHEUVEL, SOUTH AFRICA, 31.23 m., Addr. P. O. Box 4559, Johannesburg. Daily, exc. Sat. 11.45 pm.-12.50 am. Daily exc. Sun. 3.20-7.20, 9-11.45 am., Sun. 3.30-4.30 or 4-5, 5.30-7, 9-11.45 am.
9.600	RAN	MOSCOW, U.S.S.R., 31.25 m. 3-7, 7-9 pm. to No. Am. News at 7 pm.
9.600	CB960	SANTIAGO, CHILE, 31.25 m., 8-11.30 pm.
9.600	GRY	DAVENTRY, ENG., 31.25 m., Addr. See GSC, 9.58 mc. Irregular.
9.595	—	MOYDRUM, ATHLONE, EIRE, 31.27 m. Radio Eireann. 2.30-4.30, 5.30-6 pm. on odd dates.
9.595	HBL	GENEVA, SWITZERLAND, 31.27 m., Addr. Radio Nations. Irregular.
9.590	VUD2	DELHI, INDIA, 31.28 m. Addr. All India Radio, 1.30-3.30 am., 6.30 am.-12.30 pm., 9.30-11.30 pm. News at 7.45 am.
9.590	HP5J	PANAMA CITY, PANAMA, 31.28 m. Addr. Apartado 867. 12 n. to 1.30 pm., 6.30-10.30 pm.
9.590	PCJ	HUIZEN, HOLLAND, 31.28 m., Addr. (See 15.220 mc.) Sun. 2-3, 7.15-9.25 pm. Tues. 1.45-3.30, 7-8.30, 8.45-10.15 pm., Wed. 7.15-8.40 pm., Fri. 8-9 pm.
9.590	VK6ME	PERTH, W. AUSTRALIA, 31.28 m., Addr. Amalgamated Wireless of Australasia, Ltd. 6-8 am. exc. Sun.
9.590	VK2ME	SYDNEY, AUSTRALIA, 31.28 m., Addr. Amalgamated Wireless of Australasia, Ltd., 47 York St., Sundays only, 12 m.-2 am., 5-8.30 am.
9.590	WCAB	PHILADELPHIA, PA., 31.28 m. (Addr. See 21.52 mc.) Mon., Thurs. & Sat. 6.30 pm.-2 am., Wed. 9 pm.-2 am.
9.580	GSC	DAVENTRY, ENGLAND, 31.32 m., Addr. B. B. C., Portland Pl., London, W. 1. 12.57-1.45, 11.52 am.-1.30, 3.50-6 pm., 6.22-9.15, 9.37 pm.-12.30 am. to N. A. News 9.45 and 11 pm.
9.580	VLR	MELBOURNE, AUSTRALIA, 31.32 m. Addr. Box 1686, G. P. O. Mid.-9 am. ex. Suns. Sun. 12-7.30 am.
9.570	KZRM	MANILA, P. I., 31.35 m., Addr. Erlanger & Galinger, Box 283. Wkdys. 4.30-6 pm. m. tof. 5-9 am., Sat. 5-10 am., Sun. 4-10 am.
9.570	WBOS	BOSTON, MASS., 31.35 m., Addr. Westinghouse Electric & Mfg. Co. 7-1 am., Sun. 8 am.-1 am.
9.566	OAX4T	LIMA, PERU, 31.37 m., 7-8, 11.30 am.-1.30 pm.
9.560	XGAP	PEKING, CHINA, 31.38 m. Addr. S. Yoshimura, Dir. Peking Central Sta., Hsi-chan-an-chieh, Peking. 4-9 am.
9.560	DJA	BERLIN, GERMANY, 31.38 m., Addr. Broadcasting House. 6.30-10.50 pm.
9.550	HVJ	VATICAN CITY, 31.41 m., Sun. 5-5.30 am., Wed. 2.30-3 pm.
9.550	TPBII	PARIS, FRANCE, 31.41 m. Addr. (See 15.245 mc.) 11.15 am.-7 pm., 9.30 pm.-mid. Irreg.
9.550	WGEA	SCHENECTADY, N. Y., 31.41 m., General Electric Co., 5.15-8.15 pm. to So. Amer.
9.550	OLR3A	PRAGUE, BOHEMIA. 31.41 m. (See 11.840 mc.) Irreg. 4.40-5.10 pm.
9.550	XEFT	VERA CRUZ, MEX., 31.41 m. 10.30 am.-4.30 pm., 10.30 pm.-12.30 am.
9.550	YDB	SOERABAJA, JAVA, 31.41 m., Addr. N.I.R.O.M. Daily exc. Sat. 6-7.30 pm., 10.30 pm.-2 am.-4.30-10.30 am. Sat. 7 pm.-2 am.
9.550	VUB2	BOMBAY, INDIA. 31.41 m., Addr. All India Radio. 9.30-10.30 pm., 1-3.30 am. 5-6 am. also.
9.540	DJN	BERLIN, GERMANY, 31.45 m., Addr. (See 9.560 mc.) 12.05-2.30, 9.30-11 am., 4.55-10.50 pm. to So. Amer.
9.538	VPD2	SUVA, FIJI ISLANDS, 31.46 m., Addr. Amalgamated Wireless of Australasia, Ltd. 5.30-7 am., exc. Sun.
9.535	SBU	MOTALA, SWEDEN. 31.46 m. 4.35-5.05 pm.
9.535	JZI	TOKYO, JAPAN, 31.46 m. 12 m-1.30, 7-9.30 am.
9.535	—	SCHWARZENBURG, SWITZERLAND, 31.46 m., 1-2 pm. 6.45-7.45, 8-9 pm.
9.530	KGEI	SAN FRANCISCO, CAL., 31.48 m., Addr. Gen. Elec. Co. 12-3, 7 am.-12 n. to Asia.
9.530	WGEO	SCHENECTADY, N. Y., 31.48 m., Addr. General Electric Co. 3-6 pm. to Europe, 6-11.45 pm. to S. A.
9.530	VUC2	CALCUTTA, INDIA. 31.48 m. Addr. All India Radio. 2.06-4.06 am. 10 pm.-2 am.
9.526	XEDQ	GUADALAJARA, GAL., MEXICO, 31.49 m., N.-4.30 pm., 7 pm.-midnight.
9.526	ZBW3	HONGKONG, CHINA, 31.49 m., Addr. P. O. Box 200. 5-10 am., 11.30 pm.-1.15 am. Sun 5-9.30 am.
9.525	OQ2AA	LEOPOLDVILLE, BELGIAN CONGO. 31.49 m. 5.25-7 am.
9.525	LKC	JELOY, NORWAY, 31.49 m., 4.30-10.30 am., Sun. 2.30-10.30 am.
9.523	ZRG	ROBERTS HEIGHTS, S. AFRICA. 31.5 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sun. 5-7 am.; Sun. 5.30-7 am.
9.520	OZF	SKAMLEBAK, DENMARK, 31.51 m., Addr. Statsradiofonien, Heibergsgade 7, Copenhagen, 8-9.30, 6-9.05 am. and 8.30 pm.-2.40 am.
9.520	YSH	SAN SALVADOR, EL SALVADOR 31.51 m., Addr. (See 7.894 mc.) Irregular 6-10 pm.
9.520	RV96	MOSCOW, U.S.S.R., 31.51 m., 1-6 pm. (English 3-3.30, 4.30-5 pm.)
9.510	GSB	DAVENTRY, ENGLAND, 31.55 m., Addr. (See 9.580 mc.—GSC) 12.57-3.15 am., 3.50-6, 6.22-9.15, 9.37 pm.-12.30 am.
9.510	FIQA	TANANARIVE, MADAGASCAR, 31.55 m. Addr. Le Directeur des PTT, Radio Tananarive, Administration PTT. 12.30-12.45, 10-11 am., 2.30-4 am.
9.510	HS8PJ	BANGKOK, THAI, 31.55 m. Daily Ex. Mon. 8-10 am.
9.510	—	HANOI, FRENCH INDO-CHINA. 31.55 m. "Radio Hanoi", Addr. Radio Club de L'Indochine. 12 m.-2 am., 6-10 am. 15 watts.
9.505	YUC-YUD	BELGRADE, YUGOSLAVIA, 31.57 m. 11 am.-5.30 pm.
9.503	XEWW	MEXICO CITY, MEX., 31.57 m. Addr. Apart. 2516. Relays XEW. 7:45 am.-12.30 am.
9.501	PRF5	RIO DE JANEIRO, BRAZIL, 31.58 m., 4.45-5.55 pm. Ex. Suns.
9.500	VK3ME	MELBOURNE, AUSTRALIA, 31.58 m., Addr. Amalgamated Wireless of Australasia, 167 Queen St. Daily except Sun. 4-7 am.
9.500	OFD	LAHTI, FINLAND, 31.58 m., Addr. Finnish Brcst. Co., Helsinki. 12.15-5 pm.
9.492	KZIB	MANILA, PHIL. ISL. 31.60 m. 6.30-10 am. and 8.30 pm.-2.40 am.
9.475	VONG	ST. JOHNS, NEWF'L'D, 31.67 m. 7.30 am.-12.30 pm. 4.30-10 pm. irreg.

Mc.	Call	
		End of Broadcast Band
9.465	TAP	ANKARA, TURKEY, 31.70 m. 5.30-7, 11 am.-4.30 pm. Sat. 6.30-8.30 am. Sun. 5.30-7.30 am.
9.445	HCODA	GUAYAQUIL, ECUADOR, 31.77 m., 8.15-10.15 pm., exc. Sun.
9.437	COCH	HAVANA, CUBA, 31.8 m., Addr. 2 B St., Vedado. 8 am.-11 pm. Sun. 8 am.-10 pm.
9.390	OAX5C	ICA, PERU, 31.95 m., Radio Universal, 7-11.30 pm.
9.350	COCD	HAVANA, CUBA, 32.08 m., Addr. Box 2294. Relays CMCD 10 a.m.-11.30 pm. Sun. 10 am.-9 pm.
9.345	HBL	GENEVA, SWITZERLAND, 32.11 m., Addr. Radio Nations. Mon., Wed., 6.45-8.15, 8.45-10.15 pm. to N. A.
9.340	OAX4J	LIMA, PERU, 32.12 m., Addr. Box 1166, "Radio Universal." 12 n.-3 pm., 5 pm.-indefinite.
9.295	HI2G	CIUDAD TRUJILLO, D. R., 32.28 m. 6.40-8.40 am., 11.40 am.-2.10 pm., 3.40-4.40 pm.
9.280	LYR	KAUNAS, LITHUANIA, 32.33 m. Daily 12-12.40 am., and 2.30-3 pm. Sun. 1.30-2.15, 6-7.45, 11.30 am.-1.15 pm., 2-3.30 pm.
9.200	ZMEF	SUNDAY ISLAND, 32.61 m., Conts. ZIL5, N.Z. 1.45-2.15 am. Irreg.
9.192	COCX	HAVANA, CUBA, 32.63 m. Addr. San Miguel 194, Alto. Relays CMBX 8 am.-12 m.
9.188	HC2AB	ECUADOR, 32.65 m., nightly to 10 pm.
9.170	HCIGQ	QUITO, ECUADOR, 32.72 m., Mon. Wed., Sat. 9-9.55 pm.
9.143	HC2CW	GUAYAQUIL, ECUADOR, 32.81 m., 11 am.-1, 7-11 pm.
9.125	HAT4	BUDAPEST, HUNGARY, 32.88 m., Addr. "Radiolabor," Gyali-ut, 22. Daily 7-8 pm., Sat., 6-7 pm.
9.100	COCA	HAVANA, CUBA, 32.97 m. Addr. Galiano No. 102. Relays CMCA Noon-1.15 am. Irreg. to 3 am.
9.091	PJCI	CURACAO, D. W. INDIES, 33 m., 6.36-8.36 pm., Sun. 10.36 am.-12.36 pm.
9.030	COBZ	HAVANA, CUBA, 33.32 m., Radio Salas Addr. P. O. Box 866. 7.45 am.-1 am. Sun. 7.45 am.-12 m. Relays CMBZ.
8.960	TPZ2	ALGIERS, ALGERIA. 33.48 m. Tues. 12.30-1.30 pm.
8.950	COKG	SANTIAGO, CUBA. 33.52 m. Addr. Box 137. 5-9.50 pm.
8.841	HCJB	QUITO, ECUADOR, 33.5 m. 7-8.30 am., 11.45 am.-2.30 pm., 5-10 pm., except Mon. Sun. 12 n.-1.30 pm., 5.30-10 pm.
8.830	COCQ	HAVANA, CUBA, 33.98 m., 6.50 am-1 am.
8.700	HKV	BOGOTA, COLOMBIA, 34.46 m. Tues. and Fri. 7-7.20 pm.
8.665	COJK	CAMAGUEY, CUBA, 34.62 m. Addr. Finlay No. 3 Altos. 11.30 am.-12.30 pm., 3.30-6, 8-9 pm.
8.665	W2XGB	HICKSVILLE, N. Y., 34.64 m., Addr. Press Wireless, Mon. to Fri. News at 9 am. and 5 pm.
8.580	YNPR	MANAGUA, NICARAGUA, 34.92 m. Radiodifusora Pilot. 12.45-2.15, 6.45-10.15 pm.
8.572	—	BUCHAREST, ROUMANIA, 35.02 m., 8.15-10.30 am., 4-7 pm.
8.000	HCIETC	QUITO, ECUADOR, 37.50 m. Addr. Teatro Bolivar, Sats. 8-10.30 pm.
7.894	YSD	SAN SALVADOR, EL SALVADOR, 37.99 m., Addr. Dir. Genl. Tel. & Tel. 7-10.30 pm.
7.870	HCIRB	QUITO, ECUADOR, 38.1 m. La Voz de Quito. 8.30-11.30 pm.
7.854	HC2JSB	GUAYAQUIL, ECUADOR, 38.2 m. 11 am.-2, 4-11 pm.
7.850	ZAA	TIRANA, ALBANIA. 38.25 m. 6.30-8 am., 12.20-5 pm.
7.797	HBP	GENEVA, SWITZERLAND, 38.48 m., Addr. Radio-Nations.
7.614	CR6AA	LOBITO, ANGOLA, 39.39 m., Mon., Wed., Sats. 2.30-4.30 pm. Also 7.177 mc.
7.520	RKI	MOSCOW, U.S.S.R., 39.89 m. 3-6, 7-9 pm. (English 4.30-5 pm.) to N. A.
7.520	KKH	KAHUKU, HAWAII, 39.89 m. Sun. 9-9.30 pm. Sat. 7.30-8 pm.
7.490	EAJ43	TENERIFE, CANARY ISL., 40.05 m., 7-7.45, 8-9.30 pm. and Irreg.
7.450	TI2RS	SAN JOSE, COSTA RICA. 40.27 m. "Radioemisora Athena". 7-11 pm.
7.440	FG8AH	POINT-A-PITRE GUADELOUPE, F.W.I., 40.32 m., 6-7.10 pm., also 9-10.30 pm. Irreg. P. O. Box 125.
7.410	HCJB4	QUITO, ECUADOR, 40.46 m., 7-9.30 pm. irregularly.
7.380	XECR	MEXICO CITY, MEX., 40.65 m., Addr. Foreign Office. Sun. 6-7 pm.
7.310	VIG	PORT MORESBY, PAPUA, 41.01 m., 2nd & 4th Sats. each month. 3-5 am.
7.295	JIE	TYUREI, TAIWAN. 41.13 m. 9.05-10.20 am.
7.280	TPBII	PARIS, FRANCE, 41.21 m., 10.15, 12.45, 1.30-5 pm.
7.260	CSW8	LISBON, PORTUGAL, 41.32 m., addr. Emissora Nacional de Radiodifusao, rua do Quelhas. Tue., Thur., Sat. 4.05-5 pm.
7.260	GSU	DAVENTRY, ENGLAND, 41.32 m. Irregular.
7.258	JVW	TOKYO, JAPAN. 41.34 m., 2-4 pm.
7.250	YDA	TANDJONGPRIOK, JAVA, 41.38 m., Addr. N.I.R.O.M., Batavia, 10.30 pm.-2 am.; Sat. 7.30 pm.-2 am.
7.230	GSW	DAVENTRY, ENGLAND. 41.49 m. 5.42-11.30 am. to Europe.
7.220	HAD	BUDAPEST, HUNGARY, 41.55 m. 9 pm.-12 m. to N. A.
7.220	YDX	MEDAN, SUMATRA, N. E. I., 41.55 m. Daily exc. Sat., 10.30 pm.-2 am. Sat. 7.30 pm.-1.30 am. Irreg. to 9 am.
7.200	YI5KG	BAGHDAD, IRAQ, 41.67 m., 7.30 am.-4 pm.
7.200	YNAM	MANAGUA, NICARAGUA, 41.67 m. Irregular at 9 pm.
7.177	CR6AA	LOBITA, ANGOLA, PORT. WEST AFRICA. 41.75 m., Mon., Wed., and Sats. 2.45-4.30 pm. Also see 7.614 mc.
7.128	YN3DG	LEON, NICARAGUA, 42.09 m., 2-2.30, 8.30-9.30 pm. ex. Suns.
7.100	FO8AA	PAPEETE, TAHITI, 42.25 m., Addr. Radio Club Oceanien. Tues. and Fri. 11 pm.-12.30 am.
7.088	PIIJ	DORDRECHT, HOLLAND, 42.3 m., Addr. Dr. M. Hellingman, Technical College. Sat. 11.10-11.50 am.
6.990	XEME	MERIDA, YUCATAN, 42.89 m., Addr. Calle 59, No. 517, "La Voz de Yucatan desde Merida." Irregular.
6.977	XBA	TACUBAYA, D. F., MEX., 43 m. 9.30 am.-1 pm., 7-8.30 pm.
6.970	XPSA	KWEIYANG, CHINA, 43.05 m., 5.30, or 6-11 am.
6.960	2ZB	WELLINGTON, N. Z., 43.10 m., Mid.-7 am.
6.900	HI6H	TRUJILLO CITY, D. R., 43.48 m., 7.40-8.40 pm.
6.850	XOJD	HANKOW, CHINA, 43.80 m. 6-8.30 am.
6.810	HIH	SAN PEDRO DE MACORIS, DOM. REP., 44.05 m. 7-9.40 pm. Sun. 5.20-6.40 pm.
6.805	HI7P	CIUDAD TRUJILLO, DOM. REP., 44.06 m., Addr. Emisoria Diaria de Commercio. Daily exc. Sat. and Sun. 12.40-1.40, 6.40-8.40 pm. Sat. 12.40-1.40 pm. Sun. 10.40 am.-11.40 am.

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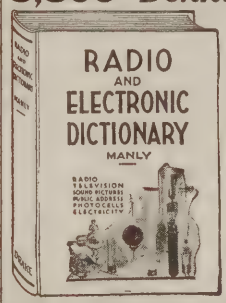

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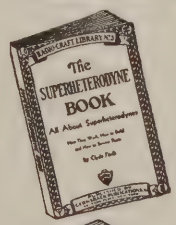

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DIATHERMY, SHORT-WAVE Therapy, and ultra short-wave therapy machines custom-built by radio engineer at considerable saving over commercial machines; 6 meters, 16 meters or any other frequency specified can be furnished. Machines substantially built with high patient safety factor. 250-300 watts output. Neat professional appearance. Automatic safety time switches. All necessary pads and electrodes. For sale only to physicians, hospitals, and sanatariums. Prices from $195.00 to $300.00. Not for sale to the general public. Write for further information giving your own specifications and requirements. Allan Stuart, 1015 Wilson Ave., Teaneck, N. J.

INSTRUCTION

$120.00 ELECTRICAL ENGINEERing Course; 60 cloth-bound lesson books. Good condition. $15.00. Harry Ackerson, Box 322, Ramsey, N. J.

PATENT ATTORNEYS

INVENTORS — PROTECT YOUR rights before disclosing your invention to anyone. Form "Evidence of Conception"; "Schedule of Government and Attorneys' Fees" and instructions sent free. Lancaster, Allwine & Rommel, 436 Bowen Building, Washington D. C.

PHOTOGRAPHY

ADVANCED AMATEURS, ATTENtion! Improve your technique and get more fun out of your hobby. Read American Photography every month, the magazine for both technicians and pictorialists. Send today for free sample copy and a copy of our 40-page book catalog. Camera House 120, 353 Newbury Street, Boston, Mass.

PRINTING

COMMERCIAL PRINTING AT MOST reasonable prices. All work guaranteed. Samples and prices on request. H. E. McKale, 6 Forest Place, Fredonia, N. Y.

QSL—CARDS—SWL

SWLS—QSLS. COLORFUL, ECOnomical. Samples. Meade, 819 Wyandotte, Kansas City, Mo.

RADIO DIAGRAMS

ANY RADIO DIAGRAM 25c. SPECIfy manufacturer, model. Radio magazine free. Supreme Publications, 3727 West 13th, Chicago.

RADIO KITS

RADIO KITS—$3.95 UP. COMplete. Single band; all-wave; 5-10 tubes. Save 50%. Parts catalog Free. McGee Radio, P-2045, K. C., Mo.

SHORT WAVE APPARATUS

YOU CAN BUY A COMPLETE, postpaid, guaranteed, and tested Ultra High Frequency converter for any all-wave superheterodyne for $1.00 from Princeton Radio, 15889 Princeton, Detroit. Not a Diagram! Directions included.

FOR SALE (NON COMMERCIAL) 3¢ A WORD

Under this heading we accept advertisements only when goods are offered for sale without profit. Remittance of 3c per word should accompany all orders. Copy should reach us not later than the 10th of the month for the second following month's issue.

FOR SALE—PAIR NEW 35 TS $8.00. New Simpson Hammeter $10.00, 250 Watt all-band, phone and c.w. transmitter, complete with everything, six months old, $150.00, original cost, $350.00. Incorporates rack and panel construction, r.f. line-up, 6L6G—809—100th—speech, 56, pair of 56's, pair of 2A3's and a pair of TZ40's Class B modulators. Antenna throw-over relay, six meters, four power supplies, and pilot lights on the panel. 15 Watt 160 meter phone rig, worked all districts, $25.00. Many extras. Send for complete list. Ben Robin, W3HYP, ex-W2BIG, 30 S. Pennsylvania Avenue, Atlantic City, N. J.

HAVE EASTMAN KODAK MODEL K, 16mm movie camera has f:1.9 lens, is in perfect condition like new cost $100.00 with leather case, will sell for $49.00. M. Lachance, 26 Howard, Lewiston, Me.

DON'T BUY A RECEIVER UNTIL you get my free list of reconditioned, guaranteed Receivers! Practically all models at money saving prices. Trade-ins. Time Payments. Send for list. W2AVA, 12 West Broadway, New York.

SACRIFICE—½ V.P. RIGONA—F2.9—Prontor II—Eveready case—filters—exposure meter, excellent, $20.00. Jack Cansler, Dickson, Tennessee.

SELLING ENTIRE STATION: COMplete to go on air, 15 watt xtal xmitter, 2 tube receiver, miscellaneous. Nothing needed but antenna. Price $10. Richard Bogert, 1416 Linden St., Allentown, Pa.

DOLLINA II F:2.9, R.F. $25. 9x12 "Avus" F:4.5 $24. Foth Derby F:2.5 $17. 116 roll film F:4.5 Radionar $10. ½ V.P. Dolly F:4.5 $9. 120 roll film F:2.9 $21. German binoculars $16. 9x12 "K.W." F:4.5 Unifocal $20. Will take Graflex or? C. Krauss, 1858 E. Venango St., Philadelphia, Pa.

FOR SALE: SKY BUDDIES $15.00, Sky Chiefs $19.00, Sky Champions $29.00, S9 Super-Skyrider $24.00; Howard 430s $17.50, 460 complete with crystal and speaker $59.00; National One-Ten $29.00, HRO $129.00, NC44 $34.00, NC81X $59.00, NC101X $89.00, FB7 $9.00, FB7X $15.00, SW3s $9.00. Breting 14s $49.00. Practically all other models cheap. All sets shipped on ten day trial. List free. Write. W9ARA, Butler, Missouri.

SACRIFICE! ACE "DO-ALL" DEluxe Six tube T.R.F. Receiver. 2½ to 3000 meters. Dynamic speaker. Complete $8.50 (Cost $26.25 new). Sangamo Watthour (electric light) meters. Used, but perfect. $2.90. Robert Lang, 227 Greenwich Street, New York City.

BARTER AND EXCHANGE — FREE!

NO ADVERTISEMENT TO EXCEED 35 WORDS, INCLUDING NAME AND ADDRESS

Space in this department is not sold. It is intended solely for the benefit of our readers, who wish to buy or exchange anything in the Radio, Television and Photographic fields for Radio, Photographic and other merchandise.

As we receive no money for these announcements, we cannot accept responsibility for any statements made by the readers.

Use these columns freely. Only one advertisement can be accepted from any reader in any one issue. All dealings MUST be above board. Remember you are using the U. S. mail in all these transactions and therefore you are bound by the U. S. Postal Laws. Describe anything you offer accurately and without exaggeration. Treat your fellow men the way you wish to be treated.

We welcome suggestions that will help to make this department interesting and helpful to our readers.

Copy should reach us not later than the 10th of the month for the second following month's issue.

SWAP—XMITTER PARTS, METERS, xformers, tubes, 203A, 860, 212D, crystals, $100 ladies' wrist watch, etc. Want service equipment, manuals, radio books of all kinds, magazines, BC radios, etc. W8JXV, 412 Seneca St., Oil City, Penna.

AIR KING PORTABLE BATTERY superheterodyne receiver for trade, brand new batteries. Broadcast, police bands. Self enclosed antenna. Extremely sensitive, featuring AVC. Want typewriter, mike, xmitting parts or? W2MPT, 332 Alabama Ave., Brooklyn, N. Y.

HAVE PORTABLE RADIO-PHONOgraph, complete new N.R.I. course, photographic supplies, Radio Service Hand Book, Principles of Radio Communication, Cathode-Ray Tube at Work, Radio Amateurs Handbook. For what have you? John Basta, 31 Lake Street, Brooklyn, N. Y.

WANTED: TWO SINGLE MIDGET 140 mmfds., variable cond. 360°. Elect. turntable two spd. preferred. Trade radio mag.; books, parts, tubes, vel. mike, 12" dyn. spk. P.A. amplifier. F. U. Dillion, 1224 Horne Ave., Hollywood, Calif.

HAVE 1/6 H.P. MOTOR, 5 TUBE midget, 7 tube Atwater Kent, tubes, many parts, cameras, No. 5 Chemcraft, speakers, etc. Want good portable, Sky Buddy or Howard. Write W. T. Windley, Box 38, Washington, N. C.

HAVE TUBELESS, CRYSTALLESS radio diagrams. One and two tube sets, treasure finder diagrams. Want U.S. stamps or what have you? John Haynes, Doe Run, Missouri.

HAVE GILBERT ELECTRIC EYE set, good condition to swap for radio equipment or what have you- Raymond Maier, 145 North Oakley St., Kansas City, Mo.

HAVE $12.50 CREDIT ON ANY Superior testers, ice skates, size 10, 2 B eliminators, any magazine and radio parts. Want good A.C. set, parts, or what have you? Edw. Sujak, 5321 West 30th Place, Cicero, Ill.

HAVE A QUANTITY OF RADIO parts in swell condition. Will trade for what have you? 100% answers. Bill Rasins, 6611 South Rockwell Street, Chicago, Ill.

TRADE 250 VARIETY CANADIAN and Newfoundland stamp collection and 298 variety U.S. collection, 4 albums, about $70 catalog value, for good miniature camera, Graflex, photographic equipment or what? Norman Lunde, Evansville, Wis.

HAVE COMPLETE SET "REFERence Handbook of Medical Science" also 100 magazines "Gay Book," "Silk Stockings," "Film Fun," "Spicy," etc., for ham equipment. Joseph Chalak, Gen. Delivery, Sandusky, Ohio.

HAVE $10 TELESCOPE, 25X, GOOD condition; 2000 foreign stamps; New International Jr., and 1935 Modern albums. Want Sky Buddy, used, good condition or what have you? Richard Loetz, 113 McKee St., Sturgis, Mich.

WANTED: 35MM ENLARGER AND other photographic equipment. Have radio transmitter and parts, books, magazines, etc. Send stamp for complete list, also send your list. Kenneth Sippel, Prophetstown, Illinois.

WANTED: TYPEWRITER, GOLF clubs or good camera. Have 60 watt CW transmitter and short wave receiver. Ervin Bartz, North Loup, Neb.

WANT EVERY TYPE OF TEST equipment. Have some cash, radio parts, Majestic 5 tube 6V. –6 amp. auto radio. Will absolutely answer promptly. Gregory Flyer, W2MJZ, 5702 14 Ave., Brooklyn, N. Y.

WANT SMALL PORTABLE MAjestic radio. Will pay $3.00 if it does not have tubes and batteries, $5.00 if in good working order, or what have you? William Brewer, 852 E. 169 Street, Bronx, N. Y. C.

WILL TRADE: COMPLETE SET OF Lincoln's Radio Engineering Course, complete with questions, for small battery radio set, typewriter or small printing press or what have you? B. C. Summers, Box 215, Willits, Calif.

(Continued on opposite page)

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Mc.	Call	
6.790	PZH	PARAMARIBO, SURINAM, S.A. 44.16 m., Addr. P. O. Box 18. Sun. 8.40-10.40 am. Tues. & Fri. 5.40-8.40 pm. 1st & 3rd Thurs. monthly 6.40-8.40 pm.
6.730	HI3C	LA ROMANA, DOM. REP., 44.58 m., Addr. "La Voz de la Feria." 12.30-2 pm., 5-6 pm.
6.720	PMH	BANDOENG, JAVA, 44.64 m. Relays N.I.R.O.M. programs. 4.30-11 or 11.30 am. Also Sat. 9.30 pm.-1.30 am.
6.690	TIEP	SAN JOSE, COSTA RICA, 44.82 m., Addr. Apartado 257, La Voz del Tropico. Daily 7-11 pm.
6.675	HBQ	GENEVA, SWITZERLAND, 44.94 m. Addr. Radio-Nations. Sun. 1.45-2.45 pm.
6.660	HI5G	TRUJILLO CITY, D. R., 45.05 m., to 8.40 pm.
6.635	HC2RL	GUAYAQUIL, ECUADOR, 45.18 m., Addr. P. O. Box 759. Sun. 5.45-7.45 pm., Tues. 9.15-11.15 pm.
6.630	HIT	CIUDAD TRUJILLO, D. R., 45.25 m., Addr. "La Voz de la RCA Victor," Apartado 1105. Daily exc. Sun. 12.10-1.40 pm., 5.40-8.40 pm.; also Sat. 10.40 pm.-12.40 am.
6.625	PRADO	RIOBAMBA, ECUADOR, 45.28 m. Thurs. 9-11.45 pm.
6.610	YNLG	MANAGUA, NICARAGUA, 45.39 m. Emisora Ruben Dario. 1.30-2.30, 6-10.15 pm.
6.565	HI5P	PUERTO PLATA, D. R., 45.70 m., 5.40-7.40, 9.40-11.40 pm.
6.558	HI4D	CIUDAD TRUJILLO, D. R., 45.74 m. Addr. Apartado 623. 12.30-2, 6-8 or 9 pm. Except Suns.
6.550	XBC	VERA CRUZ, MEX., 45.8 m. 8.15-9 am.
6.550	TIRCC	SAN JOSE, COSTA RICA, 45.8 m., Addr. Radioemisora Catolica Costarricense. Sun. 11 am.-2 pm., 6-7, 8-9 pm. Daily 12 n.-2 pm., 6-7 pm., Thurs. 6-11 pm.
6.540	YNIGG	MANAGUA, NICARAGUA, 45.87 m., Addr. "La Voz de las Lagos." 1-2.30, 8-10 pm. Except Sundays.
6.490	TGWB	GUATEMALA CITY, GUAT., 46.2 m. La Voz de Guatemala. Daily 7.45-9 am. 12.45-3.45 pm., 7.30 pm.-12.15 am. Sun. 10.30 am.-5.15 pm., 7 pm.-12 m.
6.480	HIIL	SANTIAGO DE LOS CABALLEROS, D. R., 46.28 m., Addr. Box 356. 9.40-11.40 am., 7.40-9.40 pm.
6.470	YNLAT	GRANADA, NICARAGUA, 46.36 m., Addr. Leonidas Tenoria, "La Voz del Mombacho." Irregular.
6.455	HI4V	SAN FRANCISCO DE MACORIS, D. R., 46.44 m., 11.40 am.-1.40 pm., 5.10-9.40 pm.
6.430	HIIS	SANTIAGO, D. R., 46.66 m. 5.40-7.35 pm. Ex. Suns.
6.400	TGQA	QUEZALTENANGO, GUATEMALA, 46.88 m., Mon.-Fri. 9-11 pm. Sat. 10 pm.-1 am. Sun. 1-3 pm.
6.395	COCQ	46.92.
6.388	HI9B	SANTIAGO, D. R., 46.95 m., Mon. 6-6.45, 8-8.45 pm.
6.384	ZIZ	BASSETERRE, ST. KITTS, W. INDIES, 46.99 m. 4-4.45 pm., Wed. 7-7.30 pm.
6.357	HRPI	SAN PEDRO SULA, HONDURAS, 47.20 m., 6-7.30 am., 2-4 pm. & Irreg. to 10 pm.
6.340	HIIX	CIUDAD TRUJILLO, D. R., 47.32 m., Sun. 7.40-10.40 am., daily 12.10-1.10 pm., Tues. and Fri. 8.10-10.10 pm.
6.335	OAXIA	ICA, PERU, 47.33 m., Addr. La Voz de Chiclayo, Casilla No. 9. 8-11 pm.
6.324	COCW	HAVANA, CUBA, 47.4 m., Addr. La Voz del Radio Philco, P. O. Box 130. 6.55 am.-12 m. Sun. 9.55 am.-10 pm.
6.310	HIZ	CIUDAD TRUJILLO, D. R., 47.52 m. Daily except Sat. and Sun. 11.10 am.-2.25 pm., 5.10-8.40 pm. Sat. 5.10-11.10 pm. Sun. 11.40 am.-1.40 pm.
~~6.295~~	~~OAX4G~~	LIMA, PERU, 47.63 m., Addr. Apartado 1242. Daily 7-10.30 pm.
6.280	HIIG	TRUJILLO CITY, D. R., 47.77 m. 7.10-9.40 am., 11.40 am.-2.10 pm., 3.40-9.40 pm.

Mc.	Call	
6.243	HIIN	CIUDAD TRUJILLO, D. R., 48 m., Addr. "La Voz del Partido Dominicano." 12 n.-2 pm., 6-10 pm.
6.236	HRD	LA CEIBA, HONDURAS, 48.12 m., Addr. "La Voz de Atlantida." 8-11 pm.; Sat. 8 pm.-1 am.; Sun. 4-6 pm.
6.210	——	SAIGON, INDO-CHINA, 48.28 m., Addr. Radio Boy-Landry, 17 Place A. Foray. 4.30 or 5.30-9.15 am. 11.45 pm.-1 am.

49 Met. Broadcast Band

6.200	CP5	48.39.
6.200	HI8Q	CIUDAD TRUJILLO, D. R., 48.39 m. Irregular.
6.190	KGEI	SAN FRANCISCO, CAL., 48.47 m. Addr. Gen. Elec. Co. 12 m.-3 am.
6.190	JLK	TOKYO, JAPAN, 48.47 m. 8-9.30 am.
6.190	HVJ	VATICAN CITY, 48.47 m. 2-3 pm. irreg. ex. Suns.
6.190	TG2	GUATEMALA CITY, GUAT., 48.47 m., Addr. Dir. Genl. of Electr. Commun. Relays TGI Mon.-Fri. 6-11 pm., Sat. 6 pm.-3 am. Suns. 7-11 am., 3-8 pm.
6.185	HI1A	SANTIAGO, D. R., 48.5 m., Addr. P. O. Box 423. 7 am.-5 pm.
6.185	LRA2	BUENOS AIRES, ARGENT. 4-9 ex. Suns. Sat., Sun. 7-9 pm.
6.185	TIRCC	
6.170	WCBX	NEW YORK CITY, 48.59 m., Addr. Col. B'cast System, 485 Madison Ave., 12 m.-2 am., in Jan.
6.165	HJCD	NUEVA GRANDE, COLOMBIA, 48.66 m. Eves. irreg.
6.153	HI5N	MOCA CITY, D. R., 48.75 m. 6.40-9.10 pm.
6.150	HJDE	MEDELLIN, COLOMBIA, 48.78 m., 9.30 am.-1 pm., 5-11.30 pm.
6.150	CJRO	WINNIPEG, MAN., CANADA, 48.78 m., Addr. (See 11.720 mc.) Daily 6 pm.-12 m., Sun. 5-10 pm.
6.150	ZP14	VILLARRICA, PARAGUAY, 48.78 m. 4-6 pm.
6.148	ZTD	DURBAN, SOUTH AFRICA, 48.8 m. Addr. (see ZRO, 9.753 mc.) Daily 11.20-3.45 pm., Sat. till 4 pm., Sun. til 3.20 pm.
6.147	ZBW	BULAWAYO, RHODESIA, S. AFRICA, 48.8 m. Mon., Wed., and Fri. 1.15-3.15 pm.; Tues. 11 am.-12 n.; Thurs. 10 am.-12 n. Sun. 3.30-5 am.
6.140	KZRF	MANILA, PHILIPPINES, 48.86 m. 5-9 am. Sat. 5-10 am. Sun. 4-10 am.
6.140	WPIT	PITTSBURGH, Pa., 48.86 m. Addr. Westinghouse Electric & Mfg. Co. Relays KDKA 10 pm.-12 m.
6.140	OQ2AA	LEOPOLDVILLE, BELGIAN CONGO, 48.86 m. Suns. 5.35-7 am.
6.140	SP48*	WARSAW, POLAND, 48.86 m. Irregular.
6.137	CR7AA	LAURENCO MARQUES, MOZAMBIQUE, PORT. E. AFRICA, 48.87 m. Daily 12.05-1, 4.30-6.30, 9.30-11 am., 12.05-4 pm., Sun. 5-7 am., 10 am.-2 pm.
6.130	VP3BG	GEORGETOWN, BRIT. GUIANA. 48.94 m. 9-10 am., 2.15-6.30 pm., Sun. 5.30-11.30 am., 3-5 pm.
6.130	TIEM	SAN JOSE, COSTA RICA. 48.94 m. "El Mundo", Apartado 1049. 11 am.-11 pm., Sun. 10 am.-6 pm.
6.130	CHNX	HALIFAX, N. S., CAN., 48.94 m., Addr. P. O. Box 998. 7 am.-11.15 pm. Sat. 8 am.-11.30 pm. Sun., Noon-11.15 pm. Relays CHNS.
6.130	HS4PJ	BANGKOK, THAI. 48.94 m. Daily Ex. Mon. 8-10 am.
6.130	LKJ2	JELOY, NORWAY, 48.94 m. Noon-6 pm.
6.125	CXA4	MONTEVIDEO, URUGUAY, 48.98 m., Addr. Radio Electrico de Montevideo, Mercedes 823. 8 am.-Noon. 2-10 pm.
6.122	HP8H	PANAMA CITY, PAN., 49 m., Addr. Box 1045. 6-10.30 pm. to mid. irreg.
6.122	FK8AA	NOUMEA, NEW CALEDONIA, 49.00 m., Radio Noumea, Addr. Charles Gaveau, 44 Rue de l'Alma., Wed. & Sats. 2.30-3.30 am.
6.120	WCBX	NEW YORK CITY, 49.01 m., Addr. See 6.170 mc., 12 m.-2 am. in Feb.
6.117	XEUZ	MEXICO CITY, MEX., 49.03 m., Addr. 5 de Mayo 21. Relays XEFO 9 am.-1 pm., 7 pm.-2 am.

(Continued on following page)

BARTER and EXCHANGE FREE ADS (continued)

HAVE A 5 TUBE HOME BUILT reg. set complete with built in power supply, speaker, coils and tubes. For a midget broadcast receiver portable, A.C.-D.C. Robert Bebout, 1820 So. 12, St. Joseph, Mo.

HAVE FILM-PACK CAMERA SUITable for making enlarger. Kodak film-pack 4x5. Also seven issues of Minicam. Want radio apparatus for beginner. All letters answered. W. Norman McPherson, Newcomerstown, Ohio.

SWAP—600-0-600 VOLT 200 MA transformer for good Trip., Marion or other good 0-150 ma. meter. Charles McNees, 426 Harmon Ave., Danville, Ill. W9FIT.

SWAP—AMPERITE MIKE, PHONO motor, pickup, cameras, projector, electric shaver, violin, thousand books. Want photographic supplies, 16MM films, musical instruments. M. Epstein, 2953 Ruckle St., Indianapolis, Ind.

WANTED — A.C.-D.C. VOLT-OHM-meter or five meter transmitter. Have International Scott postage stamp album with approximately 600 stamps in perfect condition. Will put in smaller album and 500 more stamps for good offer. Arthur Ferguson, Main St., Westford, Mass.

TRADE C.W. TRANSMITTER COMplete with power and tubes 6L6-801-203A. 2 crystals Coto coils, 6 meters, 1—R.F. meter, for candid camera or? Write for details. R. Blanchard, 658 Logee St., Woonsocket, R. I.

HAVE 5" HICKOK DYNAMIC MUtual conductance meter 0-2500 micromhos. What is your offer in radio equipment? E. F. Paski, 701 Enterprise Ave., Sturgis, Mich.

SWAP SEVERAL SW RECEIVERS, lots of parts, tubes, and cash, for old time sets, old license tags, old auto and radio magazines or real old car. Charles Paulaitis, R.D. 1, Lawrence Corner, Elmer, N. J.

WANT PRINT OF PATHE HOOKUP 8 tubes, No. 24A-35-35-58-56-47-47-80 long wave set. Ed Daubert, 327 W. 3rd St., Mt. Carmel, Pa.

WANTED—3-4 TUBE EFFICIENT receiver. Have 16MM projector and camera. Chas. Vaughn, 511 Central Ave., New Haven, Conn.

TRADE HALLICRAFTERS SX-17 complete with speaker used about 100 hours for mint U.S. stamps or make trade offer. W. Casper, 535—41st St., Union City, N. J.

WANTED—ANY HALLICRAFTERS receiver and 10 meter crystal. Will trade bicycle, check writer worth 82.50 QST's. What is your offer? Also will trade for other SW parts. Arthur Cobb, 10462 Wilkins Ave., W. Los Angeles, Calif.

TRADE—DUO-AMPLIDYNE 1 TUBE SW receiver for a 410 shot gun or following tubes in good condition, 6D6-6A7-75-42. Write for further information. W. R. Cunningham, RR10, Box 123, Indianapolis, Indiana.

SWAP—HOWARD 430 FOR A GOOD general cover collection or candid camera. W. Walker, 217—10th Ave. S. W., Aberdeen, So. Dak.

HAVE GUITAR WITH CASE AND music. Will swap for tube tester in good condition. Michael Halpern, 2985 Ocean Pkwy., Brooklyn, N. Y.

ICELANDIC STAMPS, PICTURES and books on Iceland in exchange for good radio set, or what have you? No stamp exchange. G. R. Paulsson, P. O. Box 1026, Reykjavik, Iceland.

WANTED: DECEMBER 1933 ISSUE Short Wave Craft Magazine. Address: Joseph P. Adrosko, 914 Lafayette St., Elizabeth, N. J.

HAVE POPULAR SCIENCE, POPular Mechanics, Modern Mechanix, and Air Trails magazines, 110 v. A.C. generator, 6 volt generator and radios. Trade for photographic equipment or what have you? Forrest L. Jones, Stanberry, Missouri.

WANTED: ROYAL SIGNET TYPEwriter, Howard R meter, Browning Preselector, Meissner Silencer, HQ-120-X, RME 69-70. Have C-2 Argus, alt acc. Howard 438 600 v. 150 ma. power supply BC3 xtal, 40m, Hetrofil. Bob Forman, Box 127, Monmouth, Ill.

WANT NATIONAL SW-3, A.C. NOT working, Ghirardi's Modern Servicing, Analyzer, Watchmaking course, tools. Have 12 ga. single, 22 cal. repeater, ¼ HP GE. motor, or? W. J. Closson, 295 8th St., Troy, N. Y.

HAVE MIKE, TUBES, SPEAKERS, xtal, Elien 7C, good shape, magazines, radio books. Want test equipment, add cash to any of the above if necessary. Helen Wax, 225 Rodney St., Brooklyn, N. Y.

10 METER 150 WATT FONE 300 watt C.W. rig rack panel type. U.T.C. Varimatch and National parts with 2" oscilloscope. Will swap for? W2GNU, Leo Moses, 546 Brook Ave., Bronx, N. Y.

HAVE: LINO CARVING SETS, Erector set, WE hand sets, audio amp., phono motor, 36-38 39/44 8" mag. spkr, cabinets, chassis and parts. Mimeograph paper and ink. George Fried, 1764 Weeks Ave., Bronx, N. Y.

TRADE CANNONBALL MASTER Headphones cost $1.89, "Ellen 3B" 3 tube battery all-wave set cost $10.00. Want portable battery radio, "Radio Physics Course," "Radio & Electronic Dictionary" or what have you? Alexander Podstepny, 217 Pine St., Phila., Penna.

WANT, LONG WAVE RECEIVER, covering commercial frequencies, such as "Sky-Marine," "Sargent" or old type Navy, Coast Guard receiver. Will pay cash or trade trap drum outfit complete. William Tietz, 1610 Mahan Ave., Bronx, N. Y. C.

TRADE: 800 WATT 32 VOLT DELco-light plant, 6 volt Pioneer Genemotor Super-Gainer receiver, 20 watt P.A. system complete, 12 watt P.A. System complete and other radio parts. A. E. Haseman, Beecher, Ill.

TRADE: PIANO, SAXOPHONE, tenor banjo, radio parts, tubes, condenser tester, microscope, gas engine, for: Hallicrafters with crystal, printing press, selfeed mimeograph. W. Logan, 1149 Chicago Ave., Chicago, Ill.

HAVE MINIATURE CAMERA, F2.9 lens, case, exposure meter, guitar, 6 tube radio, darkroom accessories. Want Retina, Welti, Volienda, or similar camera, or what have you? Jack Cansler, Dickson, Tennessee.

'38 A.C. SUPER CLIPPER, '34 Lincoln, 11 tube chromium chassis, no pwr supply. Weston 301 meters, Shure 2-B mike, Hickock meters. Trade for cameras, photo equipment or Omega "B" enlarger. E. Growden, 818 Gephart Dr., Cumberland, Md.

HAVE RADIO BOOKS, PLUG-IN coil 4 tube ac short wave receiver, operates loudspeaker. Trade for good parts, test equipment of any sort. J. H. Hood, 37 Club Drive, Greenville, South Carolina.

SWAP RECEIVER WITH COILS less pwr supply in fair condition but will fix to A-1 condition. Also parts, records, etc. What say? J. D. Wheaton, 2413 East 7th St., Superior, Wisc.

HAVE: NUMBERING MACHINE, revolution counter, scout suit, extra large, assorted boys books, Popular Science and Mechanics, flashlights, spkrs. Want: receiver, tubes, parts, mike, phones, meters, test instruments. W. I. Fried, 1764 Weeks Ave., Bronx, N. Y.

WANT RIDER'S MANUALS 4 TO 10, test equipment and wired or wireless record player. Will trade phonograph records, a. w. converter, radios, radio parts and cash. Eugene Patterson, 745 South West St., Winchester, Indiana.

I WILL TRADE A 4 TUBE ALL electric H. G. Clsin Junior Space Explorer radio in good condition for a Howard type 600 "R" meter or for a crystal mike. Richard Kershaw, 846 University St., Springfield, Mo.

WANTED—RADIO BOOKS, MAGAzines, Aviation, 1916-25 and 5-tube S.W. receiver for cash. Swap Popular Aviation, 1927-39, Model Airplane News, 1929-38 and others. Alex Jasaitis, 1126 Elizabeth, Grand Rapids, Mich.

WANTED: CHANALYST OR OTHER signal tracing equipment. State price. Have Ghirardi's Modern Radio Servicing, R.T.I. Homestudy Course for what have you? R. E. Kramer, 6311 Merkle, Cleveland, O.

HAVE FOUR YEARS RADIO & Television magazines 1935-1939, complete set of Thordarson-power and other transformers, chokes, sockets, resistors to make good amplifier. Want photo equipment. James A. Dalton, Sr., 141 S. Lynwood Ave., Glenside, Pa.

SWAP STAMPS, 32 VOLT DYNAmotor, 32 volt Delco light plant, Radio Schick razor, etc., for S.W. receiver, xmitter, wood working tools, or? Tom Smyth, Jr., W9BAW, Beloit, Kansas.

SWAP BUICK SEDAN 1927 FINE condition for Skyrider Defiant or 12-15 tube all band communications receiver. E. J. Wilson, 8643—89th St., Woodhaven, N. Y.

WILL TRADE A RADIOLA #18 table model receiver 7 tubes, standard broadcast bands only, and separate speaker to match, for something of equal value. Herman Fischer, 626 Carlton Ave., Brooklyn, N. Y.

TRADE 3 TUBE A.C.-D.C. S.W. REceiver (coils, phones) and 6 tube table "automatic" set. Interested in 2½-10M receiver or preselector and 16MM projector and camera. Elwood Brooks, 1636 E. 36, Cleveland, Ohio.

HAVE 1936 HARLEY DAVIDSON motorcycle with buddy seat, windshield, leg guards. Will swap for phone transmitter. Nelson E. Jones, R.F.D. #1, Edgewood Drive, Niagara Falls, N. Y.

WANTED: NATIONAL HRO Senior, or RME 69 and DB20. Please state prices to:—SARS6BM, Lou Grusd, 34 Millbourne Rd., Bertrams, Johannesburg, S. Africa.

HAVE 5 TUBE BROADCAST RAdio, tubes, parts; what have you? All letters answered. Would like to exchange post card views. Walter Monk, 51 Vineyard St., Providence, R. I.

WANT USED TELEPLEX OR INstructograph machine. Will pay cash, transformers, magazines or stamps. M. E. King, Hinton, Okla.

WANTED: CRYSTAL PICKUP, standard typewriter (elite), old U.S. stamps, U. S. stamp catalog. Have: 4 tube midget radio, bookkeeping books, foreign stamps, Modern Postage Stamp Album. Ralph Kiewel, 324 Grant, Crookston, Minn.

SWAP—A.C. S.W.3, BACK NUMbers QST, Radio & Television, Radio-Craft magazines, radio parts; 2A5, 5Z3, 25Z5, 6F6, 6C5, 6L6 tubes. What have you? Walter Blumer, Jefferson, Wis.

MOTOR SCOOTER, BRIGGS & Stratton engines, cornet, jigsaw, magazines, small pendants, 5 tube Sonora radio, Want good racing bike, snare drum or what have you? Waldemar Popp, Jefferson, Wisc.

HAVE ELECTRIC SHAVER, PHOTO enlarger, crutches, old style radio and printing, want stamp collection, stamps, ½ H.P. motor, stapler, paper cutter, type, paper, etc. Decker, 1630¼ W. 12th Place, Los Angeles, Calif.

WANTED: SERVICE BOOK PERtaining to Franklin tube and set tester, model H-33. Will exchange for 3 tube s.w. set. Arthur Meyer, 198A 29th Street, Brooklyn, N. Y.

HAVE: CLARINET AND CASE, guitar and case, field glasses, marine engine, Crosley battery portable. Want wind charger, shotgun, power tools, test equipment, Riders manuals; or what have you? J. Kubik, 37 Pine, Gt. Barrington, Mass.

TRADE AIRPLANE MECHANICS home study course or Triplett 321 milliammeter for tube tester, radio course, part phono pick up, or? Kelsey, 415 E. 15 Street, Tulsa, Okla.

SWAP: RADIO PARTS, NEW, USED, for 2½ volt output meter (copper oxide rectifier type). Also want test equipment, 22 rifle single or repeater, port. typewriter. E. F. Dunn, Box 73, Versailles, Mo.

TRADE—GOLF SET (LEATHER bag, 2 woods, 5 irons, 12 balls), Woodstock typewriter, Cook kit and canteen value $2 each, 2 new cots for 4x5 plate camera. F. Eisfeld, 1943 N. Kostner Ave., Chicago, Ill.

WANTED: INSTRUCTOGRAPH OR Teleplex code machine in trade for 3 tube A.C.-D.C. short wave receiver. Has self-contained speaker and coils for 15-200 meter operation. Raymond Crowell, Sloatsburg, N. Y.

WANTED ANY GOOD XMITTER OR S.W. receiver. Have 1/6 horse power electric motor, 16 MM movie projector, folding film pack camera and 1923 Freshman Masterpiece and b.c. receivers. Eck Knox, 1025 Main St., Aliquippa, Penna.

WILL TRADE TWELVE BASS piano accordion, comparable to new, for either an Argus C2, C3, Univex Mercury, or similar miniature camera. August Thee, 66 Charles St., Jersey City, N. J.

WANTED: HIGH POWER MICROscope. Have radio parts and cash, also have Ford light plans to trade for house trailer or what have you? C. E. Quinn, Roebuck, S. C.

HAVE POPULAR MECHANICS, Radio-Craft, Short Wave Craft, Radio & Television mags., and a Radio Physics Course. Want someone with 16 mm projector to show me films. C. Holstein, 246 E. 148 St., Bronx, N. Y.

HAVE S.W. RECEIVERS, TUBES, parts, cameras, magazines and many other items. Want amplifying type mandolin or guitar, 1½ V radio, 6V "B" eliminator, or what have you? George Matzke, New Auburn, Wis.

DURALUMINUM CASTING ROD, 2 piece pail, extra large tackle box with floats, bait, new line 18 lb. test, hooks, etc. Everything new. Want short wave receiver, A.C., or battery, 2 tubes up. L. Grandstaff, Bristol, Ind.

FANTASTIC BOOKS AND MAGAzines—science, weird fiction, many copies and issues. Trade for your material of this variety, or will give radio and photographic equipment in exchange. Korshak, 150 E. 91 St., New York City.

WANTED RADIO MAGAZINES ANY kind. Will pay 10c a copy. Let's hear from you. All letters answered. Ernest Harper, 534 Morton, Oakland City, Ind.

WANTED—2-20, MMFD. MIDGET var. cond., 2-100 mmfd. midget var. cond., 1—Aladdin iron core, I.F. transformer type 100, 1—50,000 ohm potentiometer. Will pay cash. Charles Moskowitz, 314 East 52 Street, Brooklyn, N. Y.

WANTED—BEST BARGAIN IN A pre-selector, also correspondents from anywhere in the world. Gavin Lordier, 825 Sibley, Hammond, Ind.

I AM INTERESTED IN BUYING A used Sky Buddy or a SW-3. Please state price and condition. Nicholas Spanos, 340 Market St., Lowell, Mass.

(Continued on following page)

BARTER and EXCHANGE FREE ADS (continued)

HAVE "NEW TUNE" FOR RADIO, gives perfect sound, takes a minute to put on. I'll swap you. Send postcard what you want to exchange it for. Arthur Helmowitz, 919 Orme Ave., Los Angeles, Calif.

ONE VICTROLA AND RECORDS all in good condition, valued more than $75.00, in exchange for something of equal value. Flora Goodwillig, 6 West 107 St., New York City.

WILL SWAP SW-3 REC. IN KIT form, SW converter, radio parts, tubes, etc., radio mags. Want good code oscillator or SW rec. Anthony Conlin, 83 Westfield Rd., Holyoke, Mass.

WILL SWAP 4 TUBE A.C.-D.C. radio, Atwater Kent dynamic speaker, Keystone motion picture machine, and 100 power microscope for a complete phone transmitter about 20 watts or more. Keith Breininger, 1931 Perth, Toledo, Ohio.

CANADIANS: WILL SWAP SKY Buddy in A1 shape for snare drum or traps equipment. Also have guitar and radio parts. Details exchanged. A. T. Kobayashi, Okanagan Centre, B. C.

TRANSMITTING TUBES FOR TEST equipment or ham receiver. Also have collection of old stamps and coins. Few pieces of old Mexican money to trade for receiver parts. Lawrence Pleasant, P. O. Box 58, Mattoon, Ill.

WANT VOCAROLA MODEL L.V. Westinghouse loud-speaker, any condition, 1923-1925 model. State prices or exchange for National Electric Manufacturers Association Radio Service Course, four books. Jose A. Garcia, Gral Portuondo 553, Santiago de Cuba, Cuba.

WANTED RADIO MAGAZINES prior to 1920 including, Wireless Age, Modern Electrics, Electrical Experimenter. State price and condition. R. C. Hanselman, 1753 W. Congress St., Chicago, Ill.

HAVE 5 TUBE U.T.C. OSCILloscope, 4 tube P.A. amplifier, G.E. elect. turntable and pickup, 2 D.B. mikes, Utah, 8 in. Universal speaker. Want communication receiver, ham gear. J. R. Reed, 2178 W. 3rd St., Durango, Colo.

WANTED: A TRANSMITTER, MIcroscope or telescope in good condition for an 110 volt A.C. current transformer, electric locomotive, tender, 10 tracks, 4 cars. All mail will be answered. Irving Siegel, 2216 Adams Place, Bronx, N. Y.

HAVE 30 WATT CW PORTABLE transmitter, 6A6 xtal osc dblr, 6A6 push push output coils for 80, 40, 20, 10. Inclosed in metal cabinet. Complete with tubes. What have you? John Zubas, Irvington, New York.

WANTED—SEMI-AUTOMATIC KEY and good 160-80-40 xtals. Have many rcvr. and xmtr parts. Will trade S.B. or D.B. mikes. Write for list! W9GZD, Paul Bossoletti, 825 Third St., South, Carrington, N. Dak.

WANTED, IN GOOD CONDITION, receivers AVR-5-A and IP-501-A. R. G. Summers, 401 Baynes St., Buffalo, N. Y.

WILL SWAP 1938 PHILCO LAYdown A.C. 3 band super, cost $38, for Howard 430 or late model Sky Buddy. Also have parts swap list. A. Fisher, Box 670, Worland, Wyo.

TRADE—LARGE RATCHET SCREW driver, radio coils, condensers, chokes, volume controls, dials, tube shields, Na-ald sockets, radio books and miscellaneous parts. What have you? Joseph Quinn, 1214 Waverly Ave., Toledo, Ohio.

WANTED, A LATE MODEL SKY Buddy, Howard or National communication receiver. Will trade 11x30 in. wood turning lathe and 32V. Delco plant in good condition. All letters answered. Edwin Trummel, Lane, Illinois.

TRADE FOR? 1—35 M.M. PROjector lens in screw focus mount, 70 ft. throw, 3 tube A.C. short wave adapter kit, A.C.-D.C. volt, ohm, ma. meter. John Arnold, Bluffs, Ill.

WANTED—COMBINATION TUBE and set tester, "Radio Physics Course," "Modern Radio Servicing" and Riders Manuals. Have 5x8 Kelsey printing press and outfit and cash. L. Neustadt, 104-15—103rd Street, Ozone Park, N. Y.

WANTED—BACK ISSUES RADIO & Television, Radio-Craft, Popular Mechanics, Popular Science, other technical, mechanical books, magazines. Also want radio, electrical parts. Send me your list. George Pidherny, 54 East 100 St., New York, N. Y.

WANT, RADIO PARTS, BOOKS, courses, magazines on radio; Mystic Mike wireless outfit, home recording outfit. Have, Iranian stamps, paintings and engravings on wood, ivory or silver. S. Constantine, The Imperial Bank of Iran, Teheran, Iran.

WANTED RECORD PLAYER, WITH wires or wireless, to play through radio. Have "Modern Radio Service" by Bernsley, new, with 1,300 pages and over 700 illustrations. E. Robles Torres, Santiago No. 9, Santiago de Cuba, Cuba.

WANTED RIDER MANUALS 1, 2, 7, 8, 9 and 10, also 6 volt A battery eliminator. Emerick J. Sepic, 2510 Harrison Ave., Eureka, Calif.

WANTED, RIDER MANUALS, WILL pay cash, also test instruments, new tubes, parts, and a good rifle. All mail answered. Have lots of parts to trade also. Joseph Geviado, 159 Sabin St., Pawtucket, R. I.

WANTED: NATIONAL NTX-30, Hallicrafter HT6, or similar all band transmitter. Complete with accessories. Swap DB-20, xtals, and Instructograph Jr. W1MGW, Bob Hart, Collinsville, Conn.

SWAP—066 PHILCO TUBE CHECKer, Mystic Mike, Philco radio model 60, Thordarson power transformers, tubes and parts. Want—Sky Buddy or small 5 to 8 watt amplifier. Alvin N. Reed, Dayton, Tenn.

HAVE HAMMARLUND H.Q. 120 REceiver. What have you? H. Mandell, 1314 Gr. Concourse, Bronx, N. Y.

HAVE KODAK FOLDING CAMERA. Excellent condition. Takes 8 2¼x3¼ pictures, snap and time, adjustable focus, single speed Hawk-eye shutter, four stops. Want photographic equipment, camera. M. Cohen, 6139 Locust Street, Phila., Penna.

HAVE PORTABLE 20 W. PHONE C.W. transmitter, 7 tube amateur super, 6L6 C.W. xmitter, monitors, 6L6AB2 modulator and speech amplifier, Mallory vibrapack, etc. Want P.A. and test equipment. Dana Heckart, W9EYB, Mission, So. Dak.

WILL SWAP A PAIR OF RCA 203-A's in perfect condition for TZ40's or similar tubes. Also need modulation and transmitting parts. Also have IPS rubber crystal. W2LNI, 573 Chester Street, Brooklyn, N. Y.

WANTED: RIDERS MANUALS, ENtire set or single edition, state condition and price. All letters answered. Mitchell Walulik, Amsterdam, Ohio.

HAVE 100 POPULAR MAGS. 1900 to 1918, 50 Police Gazettes before 1920, 40 Ring Mags. before 1937, new I.R.C. resistance analyzer and cash. Want late test equipment. K. S. Mason, 206 Irish Street, Greeneville, Tennessee.

SWL EXCHANGE

UNITED STATES

MIGUEL ANGELO, W4H124, 318 East 70 St., New York City.
PAUL ANKERMAN, 404 Lima Street, Wapakoneta, Ohio.
JOHN ANTONIO, Box 32, Elkland, Penna.
JAMES ARP, 421 Mulberry St., Williamsport, Pa.
JOHN L. BALLIN, W40H56, 40 East 66 St., New York, N. Y.
O. BARNESON, 3060 Rosswell St., Los Angeles, Calif.
LEONARD N. BARRETT, 1704 Barnard Avenue, Waco, Texas.
JOHN BASTA, 31 Lake St., Brooklyn, N. Y.
CHAS. E. BAXA, 2678 N. Halsted St., Chicago, Ill.
MILTON BENSON, 1 No. Main St., So. Hadley Falls, Mass.
PHILIP BRADY, Box 67, McComb, Miss.
ERIC BUTCHER, S/S Nemaha, Lykes Bros. S/S Co., New Orleans, La.
F. E. CAMPBELL, JR., 405 E. 4th St., Berwick, Pa.
ROBERT CHASE, 231 Henry St., New York, N. Y.
DONALD CHISHOLM, 18 Mountain Ave., Wakefield, Mass.
JOHN W. CLARK, 28-24 Utopia Parkway, Flushing, N. Y. C., N. Y.
GEORGE CRYDER, Box 299, Delaware, Ohio.
MERRIAL DAWSON, Wiley Ford, West Va.
CLAYTON DeWITT, RR No. 1, Kingston, Illinois.
FRANK DRASAL, JR., 801 N. Castle St., Baltimore, Md.
WALTER DUDEK, R.F.D. Box 152, Killingly, Conn.
ADOLPH R. DVORAK, JR., 428 South Lincoln, Madison, Nebr.
AL G. ELARTON, 5430 Carpenter St., Downers Grove, Ill.
STANLEY GARNER, 29 W. Chestnut St., Norristown, Penna.
JOHN PETER GAWEL, 96 Jewett Parkway, Buffalo, N. Y.
NORMAN E. GLOVER, 1520 Proctor St., Port Arthur, Texas.
DAVID GUTHRIE, South Hill, Virginia.
ROBERT K. HARTLEY, 118 Temple St., Hinton, W. Va.
HENRY F. HECKERT, 901 Howard St., Indianola, Iowa.
DAVID HERBERT, JR., Box 709, Lancaster, Calif.
LARRY HILKOWITZ, 31 Post Ave., New York City.
CARL L. HORTON, 16 Auburn Place, Athol, Mass.
DR. J. P. HOTCHKISS, 1430 Hyde Park Blvd., Chicago, Ill.
MIKE HOYCHUK, 5547 Saxon Dr., Garfield Hts., Ohio.
BOB JOHNSON, P. O. Box 146, Logan, W. Va.
GORDON C. JOHNSON, 2908 E. 6th St., Superior, Wisc.
KAZUO KANAI, R.F.D. Box 84, Auburn, Calif.
E. KULZE, 137-19 Carson St., Springfield, L. I., N. Y.
LAVOYD KUNEY, Fayette, Ohio.
EDWARD LANG, 3508 South 83rd St. Phila., Pa.
BOB LARSON, 618 North June Street, Hollywood, Calif.
JOHN LONG, 9406 Georgia Ave., Silver Spring, Md.
VERT MANDELSTAMM, 738 S. Park St., Saginaw, Mich.
MERT MEADE, 819 Wyandotte St., Kansas City, Mo.
JOHN T. MEEHAN, 242 Governors Ave., Medford, Mass.
BILL MILLER, 88 Greenwood Drive, Milburn, N. J.
LEWIS MOLTENI, 608 Seventh St., Union City, N. J.
WALTER MONK, 51 Vineyard St., Providence, R. I.
JOHN MOSKAL, 85 Gardner Ave., So. Attleboro, Mass.
H. GEORGE MUELLER, 5250 N. Meridian St., Indianapolis, Ind.
LOYALL MUMBY, W1SWL, 36 Burr Avenue, Middletown, Conn.
ELMER NEUMAN, 2224 Woodstock Avenue, Swissvale, Pa.
RAYMOND NORRIS, W9SWL, 935 N. Humphrey Ave., Oak Park, Ill.
"CASH" F. OLIVER, 23 Beech Street, Dexter, Maine.
BOB W. PACKSCHER, 268 East 237 St., Woodlawn He., Bronx, N.Y.
PAT R. PATTERSON, 911 St. Charles Ave., N. E., Atlanta, Ga.
E. PAVLIDIS, 139 W. 7th Ave., Conshohocken, Pa.
ALBERT PICKERING, West Medway, Mass.
GLENN S. PIDGE, 431 Azusa Ave., Azusa, Calif.
DANIEL PLATEK, 225 Division Ave., Brooklyn, N. Y.
VICTOR POLITI, 1024 Unquowa Rd., Fairfield, Conn.
BILL RASINS, 6611 S. Rockwell Street, Chicago, Ill.
LYLE M. B. RATHBUN, 145 South Ave., Syracuse, N. Y.
LAVON RIDDLE, E. High St., Rockville, Ind.
JACK ROOMY, 429 Stratton Street, Logan, West Va.
JAMES E. RUST, R. R. 2, Greentown, Ind.
ROBERT H. SMITH, 199—38 28th Ave., Bayside, L. I., N. Y.
GEORGE SMITH, JR., 79 Sewall St., Augusta, Maine.
NICHOLAS SPANOS, 340 Market St., Lowell, Mass.
RICHARD SPERLING, 100 Warner Street, Newport, R. I.
ED STANTON, Box 260, York, S. C.
VINCE and MARIE STASEN, 5347 Priscilla St., Philadelphia, Pa.
JAMES SUGIYAMA, R.F.D. Box 151, Auburn, Calif.
JAMES TOTH, 11702 Crofton Road, R.F.D. 10, Cleveland, Ohio.
J. I. VAUGHT, P. O. Box 1424, New Orleans, La.
FRANK VON PUTZ, 8612 55 Road El, Elmhurst, L. I., N. Y.
W. J. WALLACE, 1929 High St., Ashland, Ky.
AUSTIN WARDMAN, 832 Linden Avenue, East Pittsburgh, Pa.
DONALD D. WARNOCK, Eastern Howard County Radio Club, Converse, Ind.
W. J. WEIGHTMAN, 132 N. 5th, Middletown, Ind.
JACK WELSH, Kingston, Ill.
J. D. WHEATON, 2413 E. 7 St., Superior, Wis.
BERNARD and MICHAEL WOZNIAK, 4639 South Winchester Ave., Chicago, Ill.
GEORGE E. WOLFE, W6HPB, 1925 Railroad Ave., Oroville, Calif.
DON R. Yocum, Bettsville, Ohio.
CARL YOUNGQUIST, 1121-12 St., Lorain, Ohio.

AUSTRALIA

ALLEN E. WATSON, Lloyd Street, Murto, Victoria.

CANADA

JACK DAVIS, SWL-VE1, 27 Vernon St., Halifax, N.S.
NORMAN E. LANK, 932 Wilder Ave., Montreal, P. Q.
CHARLES TAYLOR, 4 Water St., St. Catherines, Ont.

ENGLAND

M. COUTU, 51 Wingfield St., Portsmouth.
DOUGLAS HALL, 101 Fagley Road, Bradford, Yorkshire.
HENRIG HON-WILLIAMS, Radio 2FUW, 17, Glanselsig Road, Blaeny-Cwn, Treherbert, Glamorganshire.
ERNEST J. LOGAN, BSWL-2, 4 Fanshawe St., Bengeo, Hertford.
A. OGLESBY, 81, Stockton Lane, York.
H. RICE, % 75 Norfolk St., King's Lynn, Norfolk.
FLORENCE TARBOTTON, 28 Curzon Rd., Bradford Moor, Bradford, Yorkshire.

NEW ZEALAND

LES. W. SUTHERLAND, 23 Milton St., Hamilton.

SOUTH AFRICA

LOU GRUSD, 34 Millbourne Rd., Bertrams, Johannesburg.
DAVE D. KRAMER, 84 Hillbrow St., Berea, Johannesburg, Transvaal.
JACK LEVIN, 13 Salt River Rd., Salt River, Capetown.

(Continued from preceding page)

Mc.	Call	
6.116	—	SAIGON, FR. INDO-CHINA, 49.05 m., 12.15-12.45, 6-6.45 am. (Eng.)
6.115	OLR2C	PRAGUE, BOHEMIA, 49.05 m. (See 11.40 mc.)
6.112	HI6H	TRUJILLO CITY, D. R., 49.08 m. 5-8.50 pm.
6.110	GSL	DAVENTRY, ENGLAND. 49.1 m. Addr. B.B.C. London. 6.22-9.15 pm., 9.37 pm.-12.30 am.
6.110	XEGW	MEXICO CITY, MEX., 49.1 m., Addr. La Voz de Aguila Azteca desde Mex., Apartado 8403. Relays XEJW 11 pm.-1 am.
6.105	HJAB	MANIZALES, COL., 49.14 m., Addr. P. O. Box 175. Dly. 5.30-10 pm. Sat. to 11 pm. Sun. 2.30-5 pm.
6.100	YUA-YUB	BELGRADE, JUGOSLAVIA, 49.18 m. 12.45-2, 11 am.-5.45, 7-9.05 pm.
6.100	WNBI	BOUND BROOK, N. J., 49.18 m., Addr. Natl. Broad. Co. 9 pm.-12 m.
6.097	ZRK	KLIPHEUVEL, S. AFRICA, 49.2 m., Addr. S. African Broad. Co., Johannesburg. Daily 12 n.-4 pm., Sun. 12 n.-3.20 pm.
6.097	ZRJ	JOHANNESBURG, S. AFRICA, 49.2 m. Addr. S. African Broad. Co. Daily exc. Sat. 11.45 pm.-12.50 am.; Daily exc. Sun. 3.15-7, 9-11.30 am. (Sat. 8.30-11.30 am.) Sun. 3.30-4.30 or 4-5 am., 5.30-7, 8.40-11.30 am.
6.095	JZH	TOKYO, JAPAN, 49.22 m., Addr. (See 11.800 mc., JZJ.) Irregular.
6.090	ZNS2	NASSAU, BAHAMAS, 49.26 m., Addr. Dir. of Tel. East St., Nassau. 8.30-9 am., 3-4, 8-9.30 pm.
6.090	CRCX	TORONTO, CAN., 49.26 m., Addr. Can. Broadcasting Corp. Daily 6.45 am.-4 pm., Sun. 9.30 am.-11 pm.
6.090	ZBW2	HONGKONG, CHINA, 49.26 m., Addr. P. O. Box 200. Irregular.
6.090	ZHJ	PENANG, FED. MALAY STATES, 49.26 m. 6.40-8.40 am., except Sun., also Sat. 11 pm.-1 am.
6.083	VQ7LO	NAIROBI, KENYA, BRIT. EAST AFRICA, 49.31 m., Addr. Cable and Wireless, Ltd. Mon., Fri. 5.30-6 am., 11.15 am.-2.15 pm., also Tues. and Thurs. 8.15-9.15 am.; Sat. 11.15 am.-3.15 am.; Sat. 11.15 am.-3.15 pm.; Sun. 10.45 am.-1.45 pm.
6.080	WCBI	CHICAGO, ILL., 49.34 m., Addr. Chicago Fed. of Labor. Relays WCFL irregular.
6.080	CRY9	MACAO, PORTUGUESE CHINA, 49.34 m., Tues. 8.30-10 am.
6.080	HP5F	COLON, PAN., 49.34 m., Addr. Carlton Hotel. 7-9 pm.
6.079	DJM	BERLIN, GERMANY, 49.34 m., Addr., Broadcasting House. Irregular.
6.077	OAX4Z	LIMA, PERU, 49.35 m. Radio National 7 pm.-1.30 am. Except Sun.
6.075	VP3MR	GEORGETOWN, BRI. GUIANA, 49.35 m. Sun. 7.45-10.15 am.; Daily 4.45-8.45 pm.
6.070	CFRX	TORONTO, CAN., 49.42 m. Relays CFRB 6.30 am.-11 pm., Sun. 9 am.-11 pm.
6.070	VE9CS	VANCOUVER, B. C., CAN., 49.42 m. Sun. 1.45-9 pm., 10.30 pm.-1 am.; Tues. 6-7.30 pm., 11.30 pm.-1.30 am. Daily 6-7.30 pm.
6.069	FIQA	TANANARIVE, MADAGASCAR, 49.42 m., Addr. (See 9.51 mc.) 12.30-12.45, 3.30-4.30, 10-11 am., Sun 2.30-4.30 am.
6.065	SBO	MOTALA, SWEDEN, 49.46 m. Relays Stockholm 4.35-5 pm.
6.060	YDD	BANDOENG, JAVA, 49.5 m., 5.30 am. on.
6.060	WLWO	CINCINNATI, OHIO, 49.5 m., Addr. Crosley Radio Corp. Relays WLW.
6.060	WCAB	PHILADELPHIA, PA., 49.5 m. Sun., Tues., Fri. 6.30-11 pm.; Wed. 6.30-8.30 pm.
6.055	VK9MI	S.S. KANIMBLA, 49.54 m. (Travels between Australia and New Zealand.) Sun., Wed., Thurs. 7-7.30 am.
6.054	HJAA	PEREIRA, COLOMBIA, 49.55 m., 9 am.-Noon, 6.30-10 pm.
6.050	GSA	DAVENTRY, ENGLAND, 49.59 m., 12.57-5.15, 11.52 am.-8 pm. to Europe.
6.050	HP5J	

Mc.	Call	
6.045	XETW	TAMPICO, MEXICO, 49.6 m. Irregular 7-11 pm.
6.040	WDJM	MIAMI BEACH, FLA., 49.65 m. 1-3 pm., 9 pm.-2 am., Sun. 4-6 pm. Relays WIOD.
6.040	WRUL	BOSTON, MASS., 49.65 m., Addr. University Club. Sun. 2-7 pm.; Sat. 6-8 pm. Daily exc. Sat. and Sun. 5.30-7.45 pm.
6.040	KZIB	6.30-10 am.
6.033	HP5B	PANAMA CITY, PAN., 49.75 m., Addr. P. O. Box 910. 10.30 am.-2, 6-10 pm.
6.030	CFVP	CALGARY, ALTA, CAN., 49.75 m. Thur. 9 am.-1 am.; Sun. 12 n.-12 m.
6.030	RV96	MOSCOW, U.S.S.R., 49.75 m. 1-6, 7-9 pm. (English 3-3.30, 7-8.30 pm.)
6.030	OLR2B	PRAGUE, BOHEMIA, 49.75 m. (See 11.875 mc.) Off the air at present.
6.023	XEUW	VERA CRUZ, MEX., 49.82 m., Addr. Av., Independencia 98. 10 pm.-1 am.
6.020	XEXA	MEXICO CITY, MEX., 49.83 m., Addr. Dept of Education. Daily 8-11 am., 2.30-4 pm., 7.30 pm.-12.45 am. Sun. 1.30 pm.-12.45 am.
6.020	DJC	BERLIN, GERMANY, 49.83 m., Addr. (See 6.079 mc.) 11.30 am.-4.30 pm., 4.50-10.50 pm.
6.017	HI3U	SANTIAGO DE LOS CABALLEROS D. R., 49.86 m. 7.30-9 am., 12 n.-2 pm., 5-7 pm., 8-9.30 pm.; Sun. 12.30-2, 5-6 pm.
6.017	HJCX	BOGOTA, COLOMBIA, 49.86 m. 9-11.30 pm.
6.015	PRA8	PERNAMBUCO, BRAZIL, 49.88 m. Radio Club of Pernambuco, 4-9 pm.
6.010	OLR2A	PRAGUE, BOHEMIA, 49.92 m. Addr. (See OLR, 11.84 mc.) Irreg.
6.010	COCO	HAVANA, CUBA, 49.92 m., Addr. P. O. Box 98. Daily 7.55 am.-12 m., Sun. until 11 pm.
6.010	CJCX	SYDNEY, NOVA SCOTIA, 49.92 m. Relays CJCB 7 am.-12.30 pm.
6.007	XYZ	RANGOON, BURMA, 49.94 m., 6.30-10 am., 9-11 pm., Sat. 9.30-11 pm.
6.007	ZRH	ROBERTS HEIGHTS, S. AFRICA, 49.94 m., Addr. (See ZRK, 9.606 mc.) Daily exc. Sun. 9.30 am.-3.30 pm (to 4.45 pm. Sat.), Sun. 8.40 am.-12 n., 12-15-3.15 pm. Daily exc. Sat. 11.45 pm.-12.50 am.
6.005	HP5K	COLON, PAN., 49.96 m., Addr. Box 33, La Voz de la Victor. 7-9 am., 10.30 am.-1 pm., 5-11 pm.
6.005	CFCX	MONTREAL, CAN., 49.96 m., Can. Marconi Co. Relays CFCF 7.45 am.-1 pm., 9 am.-11.15 pm.
6.005	VE9DN	DRUMMONDVILLE, QUE., CAN., 49.96 m., Addr. Canadian Marconi Co.
6.002	CXA2	MONTEVIDEO, URUGUAY, 49.98 m. Addr. Rio Negro 1631. Relays LS2, Radio Prieto, Buenos Aires. 5.30-10.30 pm.
6.000	XEBT	MEXICO CITY, MEX., 50 m., Addr. P. O. Box 79.44. 10 am.-1.45 am.
6.000	——	MOSCOW, U.S.S.R., 50 m., 3.30-4 pm., in Czech.
5.990	ZEA	SALISBURY, RHODESIA, S. AFRICA, 50.08 m. (See 6.147 mc., ZEB.) Sun. 3.30-5 am.

End of Broadcast Band

5.980	VONG	ST. JOHNS, NEWF'L'D, 50.17 m. Addr. Broad. Corp. of Newfoundland. 4.30-8.30 pm.
5.977	CS2WD	LISBON, PORTUGAL, 50.15 m., Addr. Rua Capelo 5. 3.30-6 pm.
5.975	OAX4P	HUANCAYO, PERU, 50.16. m. La Voz del Centro del Peru. 9-11 pm.
5.968	HVJ	VATICAN CITY, 50.27 m. Off the air at present.
5.960	HI1J	SAN PEDRO DE MACORIS, D. R., 50.34 m. Addr. Box 204. 11.40 am.-1.40 pm., 6.10-8.30 pm.
5.950	HH2S	PORT-AU-PRINCE, HAITI, 50.37 m., Addr. P. O. Box A103. 7-9.45 pm.
5.940	OAX2A	TRUJILLO, PERU, 50.51 m., Tue., Thu., Sat., Sun. 7-10 pm.

Listings of stations below 5.900 kc. (50.84 to 65.79 meters) appeared in the December issue; a corrected list will be published in the March issue, out Feb. 15.

FREE CATALOGS and INFORMATION

By carefully reading the advertising columns, you will find many offers to furnish literature containing valuable technical information that will help you in your work. Use this list freely.

Firm	*Business*	*Offer*	*No.*	*Cost*	*Adv. Page*
ABC Radio Labs.	Set Mfr.	Information		Free	599
Allied Radio Corp.	Mail Order	1940 204-page Catalog		Free	601
		Radio Builder's Handbk.		10c	613
American Radio Institute	Radio School	Booklet		Free	611
Amperite Co.	Parts Mfr.	Charts	AR	Free	604
Amplifiers-Distributors Corp.	Intercommunicating Systems	Catalog		Free	602
Approved Technical Apparatus Co.	Test Equipment	24-page Catalog		Free	579
Bliley Electric Co.	Parts Mfr.	Engineering Bulletin	E-6	10c	613
		Bulletin	E-7	Free	
		Circular	A-7	Free	
Bud Radio, Inc.	Kit & Parts Mfr.	Catalog		Free	597
Bunnell, J. H., & Company	Code Keys	Catalog		Free	602
Burstein-Applebee Co.	Mail Order	1940 Catalog	56	Free	603
Cameradio Co.	Mail Order	1940 Catalog		Free	606
Candler System Co.	Code Course	Book of Facts		Free	609
Cannon, C. F., Co.	Parts Mfr.	Folder	T-15	Free	613
Capitol Radio Engineering Institute	Radio School	48-Page Booklet		Free	611
Cornell-Dubilier Elec. Corp.	Parts Mfr.	Capacitor Manual		Free	B.C.
		Catalog	167-A	Free	
		Catalog	175-A	Free	
Dodge's Institute	Radio School	Catalog		Free	609
Goldentone Radio Corp.	Set Mfr.	1940 Bargain Catalog		Free	602
Guthman, Edwin I., & Co.	Set & Parts Mfr.	Catalog		Free	615
Hammarlund Mfg. Co.	Set & Parts Mfr.	16-page Booklet		Free	597
		"40" Catalog		Free	
Harrison Radio Co.	Mail Order	Information		Free	607
Henry Radio Shop	Mail Order	Information		Free	604
Instructograph Company	Code Machine	Information		Free	609
Lafayette Radio	Mail Order	Catalog	78	Free	599
Linguaphone Institute	Language Course	Book		Free	610
Mass. Radio School	Radio School	60-page Catalog		Free	610
Midwest Radio Corp.	Set Mfr.	1940 Catalog		Free	619
Millen, J., Mfg. Co., Inc.	Parts Mfr.	1939-40 Catalog		Free	615
National Company, Inc.	Set & Parts Mfr.	Catalog	300	Free	I.B.C.
National Radio Institute	Radio School	64-page Book		Free	577
National Schools	Radio School	Literature		Free	611
New York Y.M.C.A. Schools	Trade School	Booklet		Free	611
Par-Metal Products Corp.	Parts Mfr.	1940 Catalog		Free	606
Radio & Technical Publ. Co.	Radio Textbooks	Circulars on each Book		Free	593
Radio-Television Institute	Radio & Television School	Information		Free	610
Radio Train. Assn. of Amer.	Radio School	Book		Free	609
Radolek Co., The	Mail Order	1940 Radio Profit Guide		Free	639
RCA Institutes, Inc.	Radio School	Catalog		Free	610
RCA Manufacturing Co., Inc.	Set & Parts Mfr.	Oct. & Nov. 1939 "Ham Tips"		Free	595
Sargent, E. M., Co.	Set Mfr.	Information		Free	603
Scott, E. H., Radio Laboratories, Inc.	Set Mfr.	Literature		Free	599
Solar Mfg. Corp.	Parts Mfr.	General Parts Catalog	9S	Free	603
		Transmitting Catalog	2X	Free	
		Condenser Testers Cat.	CBCC-1	Free	
Sprayberry Acad. of Radio	Radio School	52-page Book		Free	605
Superior Instruments Co.	Test Equipment	Catalog		Free	I.F.C.
Supreme Publications	Publisher	Information		Free	607
Teleplex Co.	Code Machine	Booklet	S-2	Free	610
Triplett Electrical Inst. Co.	Parts Mfr.	Catalog		Free	617
Turner Co., The	Parts Mfr.	Catalog		Free	613
Universal Microphone Co.	Parts Mfr.	Information		Free	617
Vibroplex Co., Inc.	Code Machine	Illus. Catalog		Free	604

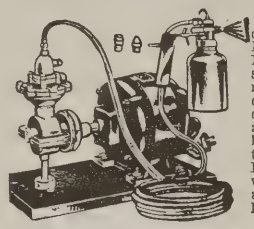
PRICED FOR CLEARANCE!

Rockbottom Prices on Overstocked New and Rebuilt Merchandise

When prices are low we buy! They're low now—LOWER THAN THEY EVER WILL BE—hence this sale. Most of the merchandise is new—never used; some of it reconditioned. 100% satisfaction on each transaction or your money refunded.
ORDER FROM THIS PAGE. Use the convenient coupon below. Be sure to include sufficient extra remittance for parcel post charges, else the order will be shipped express, charges collect. Any excess will be refunded. C.O.D. shipments require a 20% deposit. If full remittance accompanies order deduct 2% discount. Send money order—certified check—new U. S. stamps. No C.O.D. to foreign countries.

ORDER TODAY QUANTITIES LIMITED *PROMPT SHIPMENTS ASSURED*

COMPLETE ELECTRIC SPRAYER OUTFIT

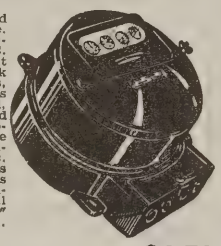


Consists of a sturdy compresser 110 V. ¼ HP, 1750 RPM Motor, 10 ft. hose, efficient spraying gun and all necessary mounting accessories. Costs only 2 cents per hour to operate. Delivers considerable air pressure. Positively will not pump oil. Few working parts to wear. Sprays practically anything. Ship. Wt. 40 lbs.

ITEM NO. 46
Kit less motor, but with gun
Your Price **$6.36**

ITEM NO. 47
The complete kit including ¼ HP motor
Your Price **$14.53**

WESTINGHOUSE WATTHOUR METER



Completely overhauled and ready for immediate service. Designed for regular 110-volt, 60 cycle 2-wire A.C. circuit. Servicemen use it in their shops to check current consumption of sets, soldering irons, etc. Keeps costs down. If dismantled, the parts alone would bring the price. The elaborate gear train could be used as a counter on machines of various kinds. Simple to install; 2 wires from the line and 2 wires to the load. Sturdily constructed in heavy metal case. Size: 8½" high, 6¼" wide, 5" deep, overall. Shp. Wt. 14 lbs.

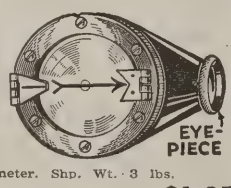
ITEM NO. 33
Your Price **$4.50**

PORTABLE TELEGRAPH AND BUZZER FIELD SETS

Made for military use by Western Electric. A wonderful buy if only for the parts it contains. New—never been used. Good for code practising, signaling, communications, etc. Contains 2-tone, high-frequency buzzer with platinum contacts, telegraph key, telephone switches, earphone, condensers, transformers, chokes, etc. A $50 value easily. Complete in wooden case with diagrams and instructions. Shp. Wt. 12 lbs.

ITEM NO. 16 **$5.45**
Your Price ....

SPERRY GYROSCOPE LIQUID COMPASS

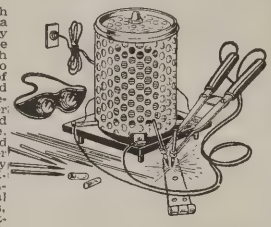


Made for U.S. Signal Corps; sensitive and accurate. Quick readings easily made from top; accurate readings of graduations through focusing magnifying lens on side of instrument. Complete with level sights and russet leather carrying case. Excellent for boats, boy scouts, campers, hikers, etc. A few turns of wire around its case makes it usable as a galvanometer. Shp. Wt. 3 lbs.

ITEM NO. 12 **$1.85**
Your Price .....

WELDING! BRAZING! SOLDERING! 3-IN-1 PORTABLE ELECTRIC TORCH

WORKS FROM 110 VOLTS A.C. OR D.C. LINE



This electric torch is not a gadget or a toy but a sturdily built outfit using the finest materials. With it you are able to do professional type of welding, brazing and soldering work, regardless of whether or not you've had previous experience. It will do a thousand and one jobs: fender welding, auto body repairs, bumpers, cylinders, tanks and industrial repairs—ideal for steel fitters, plumbers, sheet metal jobs, engineers, maintenance men, radio and bicycle repair men, etc. **Works on aluminum, brass, copper, iron, steel and other metals.**

The 3-in-1 electric torch is so simply constructed that even a boy can operate it after reading the simple and concise instructions furnished with the unit. **Not necessary to know how to strike an arc!** All you do is plug the torch into the light socket, adjust the carbons per instructions, and presto!—you have an intense, blazing flame, ready for work. **The outfit comes complete with power unit, electric cord, electrode holder, carbons, welding rods, blazing rods, solder flux, goggles, and instructions.**

Save money! Do your own repairing. **Earn money** by doing repairing for others. **Simple, practical, durable** and **safe to handle**—that's why the price is amazingly low. **Don't delay—order one today.** Shp. Wt., 8 lbs.

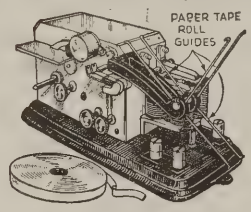
ITEM NO. 50 **$6.95**
Your Price .....

U. S. NAVY BAUSCH & LOMB TELESCOPE

Precision-built for U. S. Navy use as finders on large calibre guns. CAMERA FANS!—Use IT FOR CLOSE-UPS OF DISTANT PICTURES. Optical system comprises 7 lenses and erector and eyepiece draw tubes. Object lens 2" variable; eye lens 15/16"; exit pupil 0.2" to 0.09"; Angular field 3°30'; power 3 to 10; erect image; cross hairs used. Net wt. 6 lbs. **Original cost said to be over $130.** Shp. wt. 10 lbs.

ITEM NO. 25 **$14.95**
Your Price .....

TELEGRAPHIC TAPE RECORDER



A wonderful buy! Apparatus makes a written record of code and similar messages on paper tape. An ideal machine for learning code or teaching code to groups. Radio men can easily adapt it to short-wave receivers for taking permanent records of code messages. Double pen permits simultaneous recording of two messages. Pens are operated by battery and key while tape feeder is spring driven (hand wound). Case made of solid brass on heavy iron base. Completely reconditioned. (Less tape; easily obtained anywhere.) **Original cost $85.00.** Shp. Wt. 20 lbs.

ITEM NO. 20 **$19.95**
Your Price .....

VARIABLE SPEED UNIVERSAL MOTOR

FOR 110 VOLTS, A.C. OR D.C.

Made for Dictaphone machines by American Gramophone Co. Used, but in excellent condition. Special lever control permits variable speeds up to 3000 r.p.m., ¼" shaft extends from both sides of motor. Measures 7½" x 3¼" diam. overall. Shp. Wt. 6¾ lbs.

ITEM NO. 11 **$2.55**
Your Price .....

WE HAVE NO CATALOG. ORDER FROM THIS PAGE.

HUDSON SPECIALTIES CO. - 40-T West Broadway - N. Y. C.

IT'S EASY TO ORDER—CLIP COUPON—MAIL NOW

HUDSON SPECIALTIES CO., 40-T West Broadway, New York, N. Y. RT-2-40

I have circled below the numbers of the items I'm ordering. My full remittance of $..... (include shipping charges) is enclosed.

OR my deposit of $..... is enclosed (20% required), ship order C.O.D. for balance. (New U.S. stamps, check or money order accepted.)

Circle Item No. wanted: 11 12 16 20 25 33 46 47 50

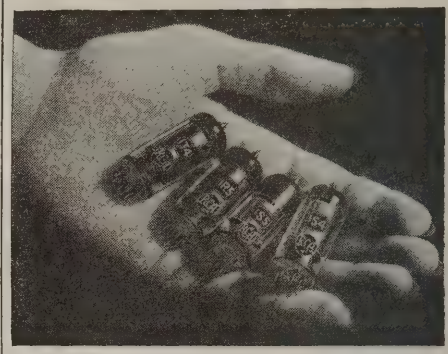
Name ..... Address .....

City ..... State .....

Send remittance by check, stamps or money order; register letter if you send cash or stamps.

Newest Radio Apparatus

New Miniature Tubes



• A LINE of 1.4 volt miniature tubes has just been announced by the RCA Manufacturing Co., Inc. The line includes the 1R5 Pentagrid Converter, the 1S4 Power Amplifier Pentode, the 1S5 Diode-Pentode, and the 1T4 Super-Control R-F Amplifier Pentode. These models provide complete tube complements for lightweight, compact, portable equipment, and are particularly suitable for use in this type of apparatus as they are only about 2" long by ¾" in diameter. They are highly efficient in operation with only 45 volts of "B" supply. The high operating efficiency is attributed to a new design which provides compactness without decreasing the size of the essential electrode parts. This compactness has been achieved largely by replacing the conventional base with a new glass "button 7-pin" base sealed to the glass envelope, and by mounting the electrodes directly on the glass button. Some of the specifications of the tubes follow:

1R5—Filament current .05 amp., plate voltage 90 max. The **1S4** draws .1 amp. on the filament, and as a Class A1 amplifier requires 45 volts on the plate and screen. Its grid voltage is −4.5, while the plate current with zero-signal is 3.8 ma. The maximum signal power output of this tube is .065 watts. The **1S5** has a filament current of .05 amp. and requires for its pentode unit a plate voltage of 45, while its pentode unit as a Class A1 amplifier uses 90 volts on the plate and provides a voltage gain of approximately 30. The **1T4** also draws .05 amp. for the filament and uses a maximum of 90 volts on the plate.

All of these tubes operate on a D.C. filament voltage supply and may be connected directly across a 1.5 volt battery.

A bulletin just issued by RCA gives complete characteristics, socket connections and graphs showing the operation of these four tubes.

New Catalogs

Hammarlund

• THE new Hammarlund "40" catalog is a handsome affair of 20 pages. It opens with pictures, blurbs and descriptions, prices and specifications of the "MC" line of midget condensers, which is followed by equivalent data on the "MCD" split-stator, "MCD-X" and "MC-X" double-spaced, and "MC-B" band spread condensers. Next come the "TC," "MTC," "TCD" and "MTC-D" transmitting condensers; "HFA" and "HFB" condensers; the "SM" star midgets; the "PAC" and "HF" micro and "HFD" split-stator micro condensers; neutralizing condensers; trimming and padding condensers; coil and tube shields; flexible couplings; variable transformers; chokes; plug-in coil forms; exciter units; crystal sockets and isolantite insulators. Of even greater interest are such complete units as the "PA-300" amplifier, "BD-40" buffer driver, "OD-10" oscillator doubler, "PA-500" amplifier, "ED-4" exciter-amplifier, and "EU-4" exciter unit. Complete Hammarlund sets, known and liked by radio enthusiasts, are the "HQ-120-X" and "Super-Pro," both of which are fully described and pictured in the catalog, the number of which, should you care to request it through this magazine, is No. 113A.

United Transformer

• THE line of United Transformer Corporation's transformers for broadcast and commercial service is given in a handsome 2-color 64-page catalog known as Bulletin No. BC-1. Not only does this catalog give prices and specifications of the various transformers in the line, but it also shows many interesting diagrams for such adjuncts as preamplifiers, broadcast transmitters, phono-radio amplifiers, mobile amplifiers, public address systems, etc. Equalizers and communication networks are also shown in diagrams, together with graphs giving their characteristics.

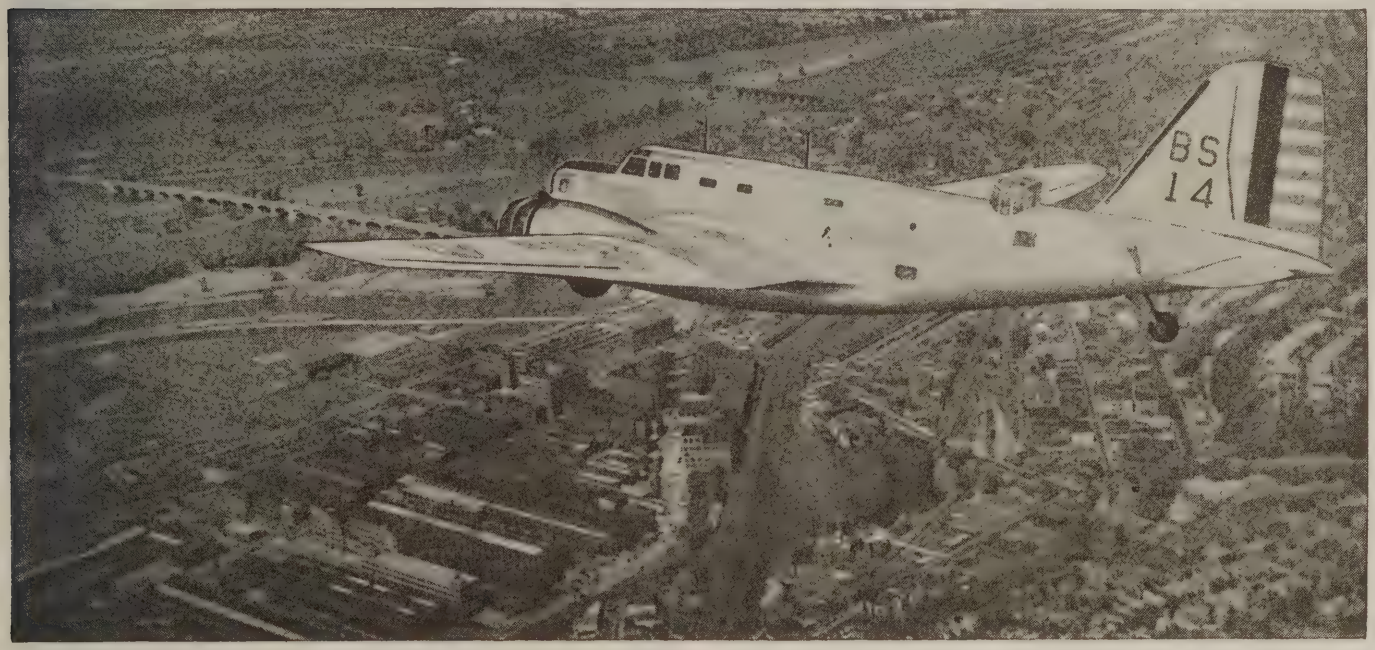
The book should be of great interest to anyone who, for either pleasure or profit, is engaged in the design or construction of amplifiers or transmitters.

When you take that plane ride, put your camera in your pocket! You don't need a special job for "Plane Pix."

FOTO-CRAFT

SECTION

Edited by Robert Eichberg



Top photo shows U.S. Army bomber over Schenectady, an example of a slow speed shot. Robot, 1/50 at F:1.16, Panatomic, Dr. Sease 3.

Minicams for Airplane Pix

Duane Featherstonhaugh

● MANY an otherwise adept amateur photographer has thrown up his hands in despair when it has been suggested that he use his miniature for aerial photography.

"Impossible!" he has said. "Only a camera with a long focal length lens and employing a fairly large negative can be used successfully from an airplane. The miniature may be able to do everything else—but aerial photography is one branch of the art that the miniature can never conquer."

A more logical reply to such an argument, is a glimpse of some aerial shots that have been taken with the miniature, together with an explanation of the reason why the small camera was chosen for those particular pictures.

Aerial photography is becoming more and more popular and there is no reason why the amateur should not employ his miniature to capture scenes that may bring him both pleasure and profit. Because of this, and because of the fact that so many persons now travel by air, one may well study the operation of the minicam as employed in this type of photography.

Do not, however, expect your miniature to turn out work comparable to specially designed aerial cameras that may cost upward to several thousand dollars. What the reader may expect is, with a little care in taking the picture and processing, photographs equal in quality to those turned out by the average photo studio or newspaper photographer employing standard, large-sized cameras or cameras which have been modified somewhat for aerial use.

By the very nature of their design many miniature cameras embody the ideal features for aerial work. They are equipped with metal bellows, have high lens and shutter speeds, a large film capacity and are easily handled, the last being an important consideration.

The miniature, of course, also has several disadvantages.

(Continued on page 639)

Lower picture gives view of river and canal lock dam from air at altitude of about 800 feet. Super Ikonta B, 1/100 at F:1.11, Panatomic, Dr. Sease 3.

MONEY from *Your* Camera

James G. Nolph, Jr.
International Correspondent

Expensive equipment and years of experience are unnecessary, says the writer of this article, who sold some 2000 pictures in ten months.

● A SUCCESSFUL news photographer does not have to hold a degree in cinematography, neither does he have to own the finest camera equipment. These factors would assist him in attaining results but would be of little value if he failed in the more important knowledge of knowing *where to sell* and *how to analyze* his pictures.

In spite of the numerous advertisements advising the amateur to send his pictures to this and that agent or agency, such is the worst possible medium of disposal. All pictures should be sold either *directly to the consumer* or *to a legitimate syndicate*. The net profits realized will increase many fold.

The writer, having owned only a box camera purchased a small 35 mm. camera, equipped only with an F 6.3 lens, and a shutter speed of only 1/100 sec. I made some 300 test pictures and learned just what I could expect from the box. A dark interior was found to require some 30 seconds for average exposure. Such a description places the camera far below the level of the 1939 amateur, and that was just 3 years ago. A hook-up with four trade journals gave me an income of $125. each month. In return for this sum I wrote a 1000 word article for each and made pictures of activity in their field of business in the Orient. This I knew would pay only my living expenses and I would have to arrange other sources of income to cover transportation.

One of my editors advised me to arrange a sale of pictures and pointed out it was as easy to start at the top with a syndicate. It was a case of, "A fool steps in where Angels fear to tread."

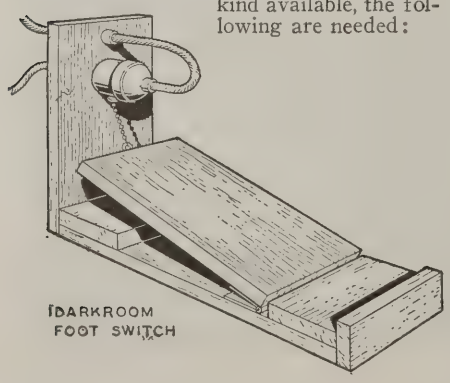
I did, however, learn many important

(Continued on page 639)

A Foot Switch for Darkroom—*K. M. Dickie*

● THE scrap-heap will furnish most of the materials for this easily built foot-switch which, when turned on, will stay on until it is again pressed by the foot. This feature enables the operator to move about while the current is on.

Besides the wood, which may be of any kind available, the following are needed:



DARKROOM FOOT SWITCH

A butt hinge about 1½ inches with screws.

A chain-pull light-socket. (A defective one can often be repaired by disassembling and adjusting.)

A lampshade ring which screws on light-socket. (Remove the wire brackets from a lamp ring taken from a discarded lampshade.)

A piece of coil spring of about 1½ inches free length (e.g., the spring cable protector from an old electric iron plug.)

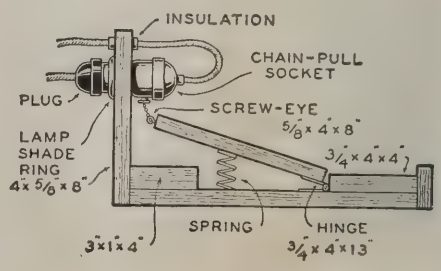
A small screw-eye.

A screw-in plug socket and prong plug.

Cable of requisite length.

After the treadle has been assembled on the base, as shown in the sketches, you are ready to drill the upright. Cut a hole in this piece about 5½ inches from the bottom end and of a size to accommodate the pull chain socket snugly as far as its rounded shoulder. Connect the wire to the socket and insert the socket, chain downward, in the hole; then tightly screw the lampshade ring on the opposite side of the upright. Mount the upright on the base, and loop the wire through a hole in the upright about an inch above the socket. This hole should be protected by means of a fiber sleeve or similar insulation, and the wire should be

(Continued on page 637)



PORTRAITURE—*As a Fine Art*

Ray Lee Jackson
NBC Portrait Photographer

● THE first rule that a portrait photographer must always keep in mind is this: *never forget the human approach.* No matter how wonderful a camera technician you may be, you will not create a successful portrait unless your subject is put into the right mood for the operation. Your whole approach must be strictly human—not that of a grim dentist about to extract a mean molar from his patient's mouth.

To put my subject at ease—whether it be Arturo Toscanini or a minor radio performer—I usually ask him (or her) questions about his particular field of work. Then, and only then, do the taut knots in his face relax and his worried, unnatural lines disappear. You must make your subject forget that he is posing, that he *must* "pose" in order to become photogenic. All this is old stuff—yet so essential that it cannot be repeated too often. I even go so far at times as to make a clown of myself in order to build up my subject's confidence. The average subject is scared to death of the camera painter with his awesome paraphernalia, and if you can cure his inferiority complex by acting the clown—go to it! Anything to create a successful picture. Perish the means!

I mentioned the awe-inspiring paraphernalia which usually is part and parcel of the camera portraitist. Most of it, in my estimation, is pure bunk. I use as little equipment as is possible, and invariably achieve the best effects in this way, both from the psychological viewpoint of the subject and straight technical results. I've "shot" practically every notable person—from Mrs. Franklin Delano Roosevelt to Ed Wynn—who has appeared on the radio since I've been with the National Broadcasting Company; and practically every one of them under the same conditions. My exposure (about one second) is virtually automatic; I squeeze the bulb for that length of time for everyone without thinking.

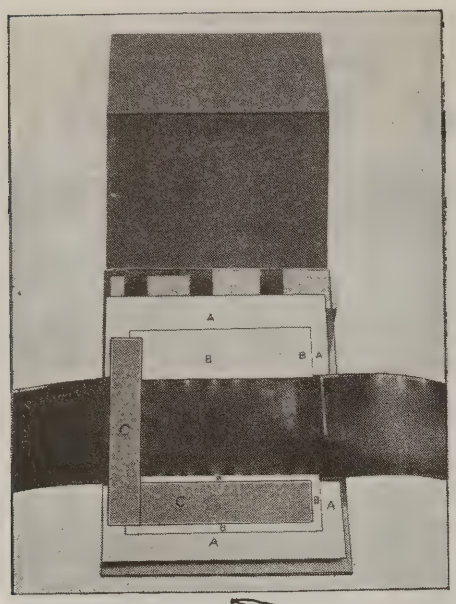
My lighting is equally unpretentious. I use one front spotlight and two smaller side spots to emphasize the profile highlights, plus one flood. When I want a silhouetted figure—one that *stands out*—I also use a few background lights; conversely, when I want a "monotone" portrait—one in which the subject blends in with the entire scene—I omit the back light.

Portraits above are (left to right) of Irene Rich, Arturo Toscanini and Rudy Vallee. Below is a full-length portrait of Margaret Speaks.

As for the backdrops themselves—first let me emphasize that my work is essentially for newspaper and magazine reproduction, and editors do not want backgrounds for the portraits. I used to include them on occasion, but no longer do so, as they are invariably blocked out anyway. I use plain backdrops, usually white, with a smooth surface. And I see little reason for throwing in extraneous scenic material in character studies anyway. A plain background practically always concentrates the viewer's attention directly toward the subject.

I never use make-up for men; the lines on their faces are what make them interesting, bring out their character, make the portrait a living reproduction of themselves. Even dissipation often makes a man's face more than ordinarily interesting—in a Byronic sort of fashion. But alas! the same cannot be said for the fair sex. In their case, time and the lines it engraves on the face must be concealed or at least toned down, for, if not prettiness, at least freshness or charm is what makes a successful woman's portrait. And to reach these ends I have found panchromatic make-up to be the best—as much for the psychological effect on the subject as for the corrective effects on the features and lines. The subject's facial expression, as she looks at herself in the mirror after the applica-

(Continued on page 636)



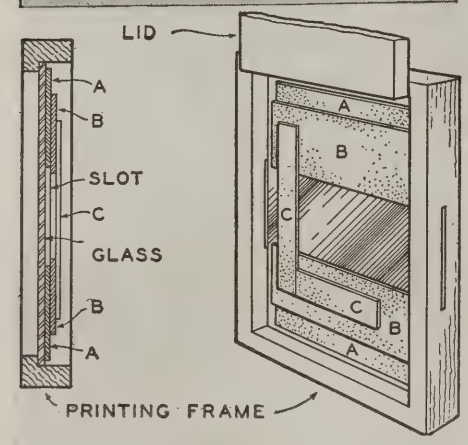
Save Time with This STRIP PRINTER

S. E. Sampsell

● CUTTING a roll of film into eight or more negatives requires time. But this is nothing compared to the time required to center and adjust the eight negatives individually on the printer. The glass must be dusted each time. A negative will slip occasionally, making a black streak along the border. These and a few other difficulties run your minutes into hours.

All these annoyances can be eliminated by using a strip printer, which can be made at home for a few cents. The construction is simple, and requires less than an hour's time. I have used one for four years for roll film, and have found it very satisfactory. A few of its merits are: *Quick change of negative frames. Negative is held securely in proper position. Glass requires only one dusting. Ground glass may be used for retouching. A fair amount of dodging may be accomplished. Any size border desired. Film may be kept in strip, and printing exposure, grade of paper, etc., be recorded between negative frames.* The printer can be made for any size roll film.

The negative mask, film carrier, and paper bracket are glued to the "slick" side of the glass; the rough, ground, side is used for retouching, etc.



To construct this apparatus, first secure a piece of ground glass, the size of which will depend upon the dimensions of your film. A 4 by 5 glass is sufficient for a 2¼ by 2¼ or smaller. Cut a piece of mask paper or cardboard the same dimensions as your actual print. For example, if your negative is 2¼ by 2¼, cut the mask paper to 2⅛ by 2⅛. This will give the negative a safe edge of 1/16 inch. Rub some mucilage on the center of this paper, keeping it well away from the edges. Center the paper on the ground glass, and press it down flat. Cut four strips of lantern slide binding. (Scotch tape may be used, but it is not as satisfactory.) Moisten these strips and place them carefully on the glass around the paper, to form the negative mask, letting them dry a little first. If the tape is too moist, the glue will ooze out along the edges. This necessitates careful cleaning, otherwise the straight edge will be scarred. The mask paper is now torn off. Moisten the paper which has stuck to the center and scrape it off with a razor blade.

The glass is now ready to be rigged with the film guide. Take a piece of film and

(Continued on page 638)

BETTER PRINTS — *if You're Careful!*

Sidney A. Diamond
offers the beginner some hints on darkroom technique.

● IN any field of endeavor, the expert trying to instruct the novice is likely to overlook as unimportant and obvious a number of elementary details. Yet these same details are often very puzzling to the beginner. They retard his progress and lower the quality of his results.

With photography, this situation is common where the technique of development is concerned. It is not the author's purpose to discuss the problems of developing negatives. Most amateurs today have learned the excellent habit of using a standardized tank development, controlled by time and temperature, so that no trouble arises. But a careless technique in handling prints and enlargements is unfortunately common. Most photographers don't understand the simple points of care and the few tricks of working in a darkroom which spell the difference between a *good* print and one that is just so-so.

Only a few pieces of apparatus are necessary—and a standard method of procedure. The important principle is exceedingly simple. It may be expressed in just one word—*cleanliness.* In practice, this is accomplished by keeping one solution from contaminating another as much as possible. This not only increases the effective life of the chemicals, but also improves print quality noticeably and minimizes waste by eliminating the possibility of stains and spots.

The usual number of trays employed is four, and a photographer generally lines them up so that he can work from left to right. The first tray contains developer, the second an acid short-stop bath, the third hypo, and the fourth is for washing. The hypo and wash trays should be somewhat larger than the first two. Prints ordinarily accumulate in them, and it is poor economy to try to crowd too many into one tray. On the other hand, a tray just a couple of inches larger than the size of paper used is the most economical for developer.

The back of each tray should be marked to indicate the solution for which it is used. This can be done with a china-marking pencil, which is waterproof. Then reserve each tray for its own type of chemical. Even with careful washing, a tray in time will pick up a slight amount of chemical deposit. If it is then used for a different purpose, stains may appear on the prints. And the strength of the solution will certainly be affected.

Why is all this so? The answer is a simple one if you have even the slightest knowledge of chemistry. Developers are alkaline, but hypo and short-stop solutions are acid.

(Continued on page 634)

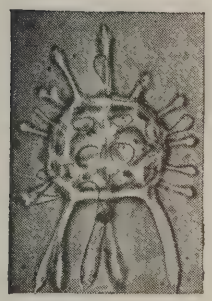
NEW CONTEST

● CAN you arrange a fantastic composition of the still life sort? Let your imagination run riot. If you crochet a ring of rosebuds around the inside of a percolator, then fill it with coal and dried orange peel and finally top it off with a few ostrich plumes or a dash of whipped cream, your picture of it against a background of old safety razor blades and broken shoe laces *may* win a prize. For full details and examples of *Surrealistic Snaps,* see the March issue of this magazine.

Make a Camera for Microphotography

Dr. E. Bade

Easily made, inexpensive camera for use with any microscope opens world of wonder for Foto-fans



Ceratospyris Preyeri. (200 diam.)

● THE camera used for taking pictures with the microscope differs from the ordinary camera in that it uses no lenses of its own. This, of course, makes the construction of a photomicroscopic camera comparatively easy. In fact all that is demanded, in its greatest simplicity, is some kind of a light tight support for the film to be held firmly above the microscope itself.

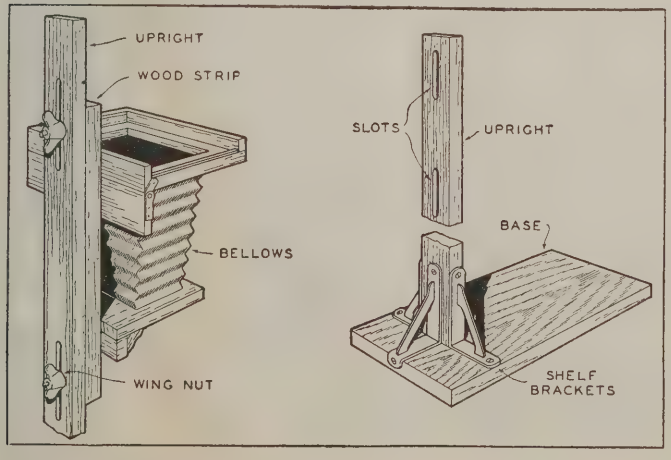
The reason that no lens is needed in such a camera is that the microscope is provided with this essential element. Introducing more lenses, even the best camera lenses, is foolish for they are not required; the lens system of the microscope takes over the function of the camera lens.

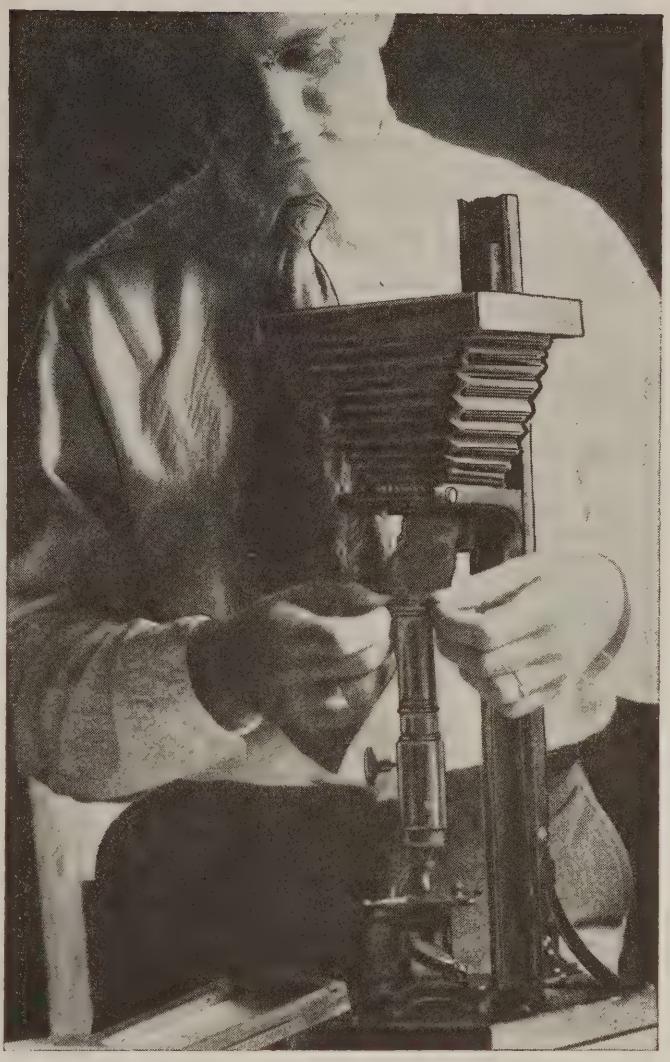
For best all around results it is not wise to fix the distance that the film is held above the microscope. It should be variable, for by varying this distance the magnification that can be obtained with the lens system of the microscope can be modified.

The reason for this is that, at 10 inches above the eye-piece, the film used to take the picture will magnify the full rating of the lens system used. For instance, if the eye-piece and the microscopic objective magnify 50 diameters, the negative will also magnify the object 50 diameters when the film is held 10 inches above the eye-piece. If, now, the film is only half of this distance or 5 inches above the eye-piece, the magnification on the negative will be half the rated value or only 25 diameters. In addition, when the film is held 20 inches or twice the normal distance above the eye-piece, the magnification also doubles so that the image on the film will now be enlarged 100 diameters. The distance of 10 inches above the eye-piece is taken as a standard and all other distances must be figured as either decreasing or increasing the rated magnifying power of the microscope.

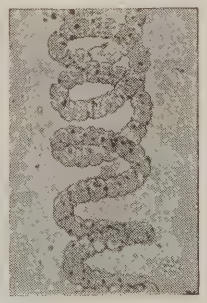
Polychaetus Speo. (250 diam.)

Detail of camera for microphotography.





This is of great help in photomicrographic work and the camera should be built to take advantage of this variable magnification. Probably the most satisfactory system is to use an old bellows and build the camera around it. If one is not at hand, an old second hand bellows can be obtained cheaply in many of the larger camera stores. Even an old lens-less folding type of camera can be employed for this work.



Anabaea Spiralis (Algae). (250 diam.)

Once the bellows has been obtained, the real work can begin. First make a base provided with an upright. The base, one inch thick, can be any size—10 by 12 inches is usually large enough. The upright is firmly fastened at the center of one edge. To prevent motion, angle irons or small shelf brackets are used to brace it. This upright is a piece of wood about 1 inch thick, 2 inches wide and 20 inches high. The exact height will depend upon the bellows extension. Near the top and also about half way up are a pair of slits cut into the wood as shown in the drawing. This is for raising or lowering the bellows assembly.

The entire bellows assembly is now attached to another strip of wood, also about 1 inch thick and 2 inches wide and a little longer than the bellows extension when fully open. This strip of wood carries a bolt above and below the bellows assembly. It is by means of these bolts, which are provided with winged nuts, that the assembly is held in position on the upright.

(Continued on page 637)

A Course in Composition

In response to many hundreds of requests for articles on the subject of Photographic Composition, and by special arrangement with the Amateur Photographer and Cinematographer, the Editors are now able to present this unexcelled course.—Editor

By RICARDO — Lesson 3

Watch the Horizon!

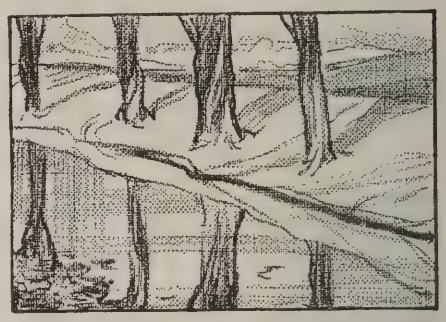
FOLLOWING the principle discussed in last month's lesson that the main point of interest should be placed near one of the "thirds," is the further suggestion that, wherever the horizon is at all prominent, it is advisable to see that it does not appear half-way up the picture space, but higher or lower according to the rest of the subject matter.

The reason can be simply explained in one word—*symmetry*. If we divide a picture into two equal parts, whether vertically or horizontally, one's interest is immediately divided between the two, and that should never happen in good pictorialism.

If one of the halves is at all uninteresting then the equal division is even more prominent as shown by the first sketch, where we have a perfectly blank sky. It is worse still to show the horizon sweeping across from one side of the picture to the other side without any interruption such as the trees shown in the little illustration.

A viewpoint slightly lower than that taken in the first picture, is shown in the second. This has further improved the arrangement by separating the foliage from the distant skyline, while the immediate foreground is strengthened by a stronger base.

A Point on Reflections



REFLECTIONS in water can be very attractive, largely due to the novelty of seeing everything upside down and repeated in shape, but this does not mean that they will be equally pleasing when seen later on a photographic print.

If the reflections are an almost exact duplication of the original with the water more or less still, then, similar to the point on horizons discussed on the left of this page, the interest will be divided between the two also. There is also the irritating desire to study the reflections and compare them with the original, and when this happens it is certain that there cannot be one main point of interest. Study the first sketch, which shows the trees so reflected that it is almost the same arrangement if the print were inverted. Then examine the second illustration and make a comparison.

It was decided that the reflections were more interesting than the trees themselves; therefore a more downward viewpoint was chosen. The viewpoint was also moved slightly to the left, enabling the main tree trunk to be placed away from the vertical center of the picture and the total result is more variety and better balance. Remember, that if the reflections are to be focused sharply, they lie approximately in the same plane as the trees themselves, and to focus on the water surface would mean that the reflections would be fuzzy.

Avoid Distracting Detail in Composing Your Pictures

ONE of the first things that the novice must learn is that sharp detail is not wanted all over the picture space—from the pictorial point of view.

It is a source of satisfaction to many photographers to produce negatives full of hard, biting detail in preference to negatives which have only the essential parts sharply focused, with the remainder in soft focus. While scientific and "record" subjects may demand sharp detail from corner to corner of the negative, this can be a serious drawback to pictorial effects.

It cannot be stressed too much that the beginner should endeavor to find out what appeals to him most in the subject, and then take care that it is presented in a pleasing manner, free from all distractions, so that what prompted the photographer to make the picture is quite obvious to other people.

The sketch at the left is a rough representation of a subject that would be admirable from an archaeologist's point of view because it shows the construction of the ruins, but disastrous from the pictorialist's purpose because of the "bittiness" that is seen everywhere. The second sketch eliminates much of the distractions and consequently has a much stronger appeal as a picture.—(EDITOR'S NOTE: *There is some controversy about sharp and soft focus. Readers' opinions will be welcome.)*

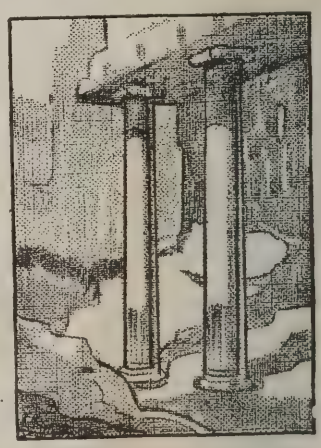


Foto Hints and Kinks

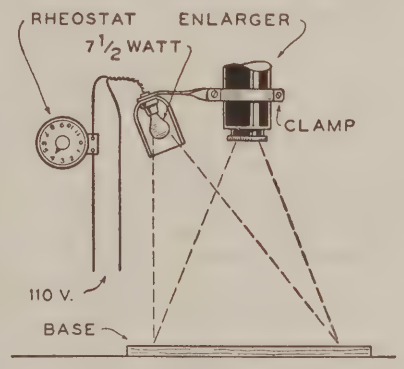
ENLARGING: Exposure Meter

● A DEVICE telling the exact exposure to give your paper when enlarging without the bother of test strips and guesswork is shown in the accompanying illustration.

The negative is placed in your enlarger, adjusted for size and focus, and then stopped down to insure sharpness in the usual manner. The small seven and a half watt light is then switched on and the rheostat adjusted until the image on the paper holder just fades from view. You then look at the rheostat which you have calibrated in seconds, and the exact time is referred to by the pointer.

Some amateurs may find the white light an

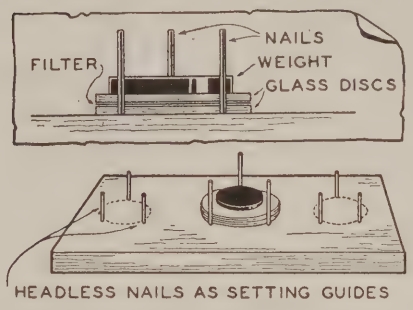
(Cont. on page 640)



CONSTRUCTION: "Hot" and "Cold" Filter Mounting

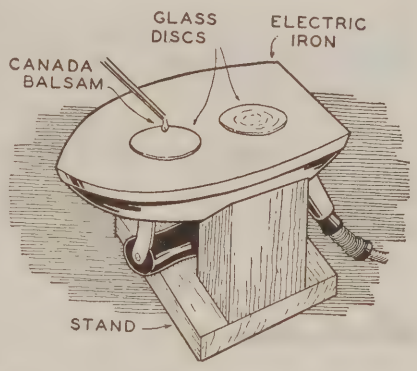
● FILTERS, a necessity for every fotocraftsman, are normally available in the costly mounted form, or the inexpensive but easily damaged unmounted type. The photographer, however, will find it by no means difficult to mount his filters, and by spending a few minutes at this work, will save himself considerable expenditure.

There are two principal methods of mounting: the "cold" and the "hot" methods, both of which are described. The jig needed for both methods and a heater unit for the "hot" method are illustrated herewith.



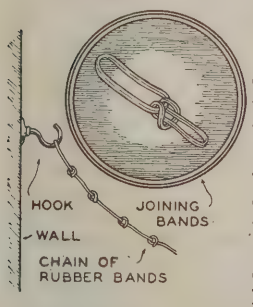
"Cold" Method. Place one of the glass circles upon the filter material and scribe or mark the outline upon the Polaroid. Always handle the glass or filter material *by the edges;* keep greasy fingers off all flat surfaces. Clean these surfaces with dry lens paper or soft cloth, if they become finger-marked. Cut out the circle of filter material outlined with a sharp scissors. Clean the glass covers with soap and water and dry with the lens paper. Be sure no dust, dirt or grease remains on either the glass covers or the filter material. Hold the glass over an open flame to drive all moisture off and place one cover flat down with the cleanest side up between the nails of the stacking guide. A

(Cont. on page 640)



Film Holder for Tray

● AFTER having tried developing trays of the roller type, I hit upon an easier method of running film through a tank bath. Twelve rubber bands are linked together as shown in the accompanying sketch, and one end of the chain thus formed is fastened to a film clip. If no clip is available, two spring type clothespins may be fixed together as shown in the other drawing. Then a hook eye is screwed into the wall over the dark-room work bench and the chain of rubber bands hooked over this.



The end of the film is clamped in the clips and the other end held in one hand. The other hand may be used to steady the tray, etc. In this way, the rubbers act as an assistant, letting the film down and pulling it up as the fotocraftsman moves his hand up and down.—*Elmer McElreath.*

Drying Film in One Minute

● WET camera roll film and film packs can be easily dried in one minute by utilizing the characteristics of a well-known photographic chemical, *potassium carbonate,* which has the property of absorbing moisture very rapidly. Amateurs and professionals who have accidentally left a can of it open have learned this to their sorrow!

Sufficient water to immerse the film properly is poured in a developing tray or suitable pan. To the water add potassium carbonate until no more will dissolve. The solution now has an oily appearance and is ready for the wet film. Surplus water is removed from both sides of the negative. The film is then immersed in the saturated solution for one minute. The negative will begin to feel hard and dry immediately. The film is then laid on a flat surface and polished with a cloth to remove the greasy surface.

After printing the negative, it should be washed for 15 minutes in water at 65 degrees. Water warmer than this will cause the gelatine to leave its film support. However, this danger can be avoided by soaking the film for a few seconds in a 10% formaldehyde bath immediately following clearance in the fixing bath. This quick-drying process is not recommended for plates, due to the fact that the emulsion does not adhere to plates as well as to film.

The quickest known method of drying plates requires about seven minutes. Immediately following fixation the plate is given a quick rinse of one minute under the tap. It is then squeegeed to remove surplus water and immersed in a tray containing one part formaldehyde (80%) to four parts water, for five minutes. Upon removing the plate, it is slipped between two blotters to remove surplus solution and then held over an electric heater to dry, which usually takes about a minute or two minutes. Blow the plate at frequent intervals to hasten drying and to avoid overheating.—*Jack Honrine.*

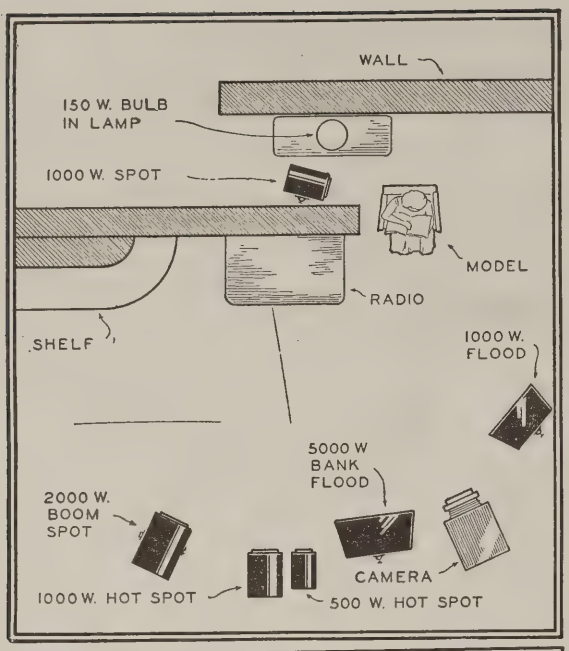
FOR THE BEST photo hint published each month, a 2-years' subscription to **Radio & Television** will be awarded.

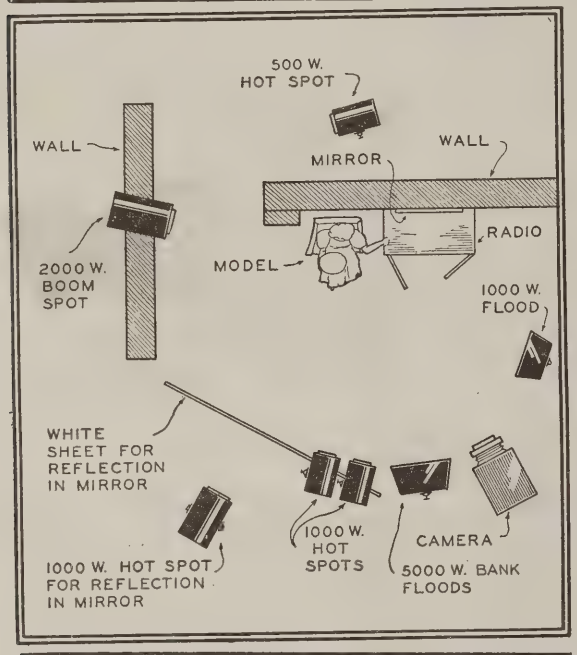
For the next five best, 1-year's subscription each will be given. All others appearing in this department will receive 8-months' subscriptions.

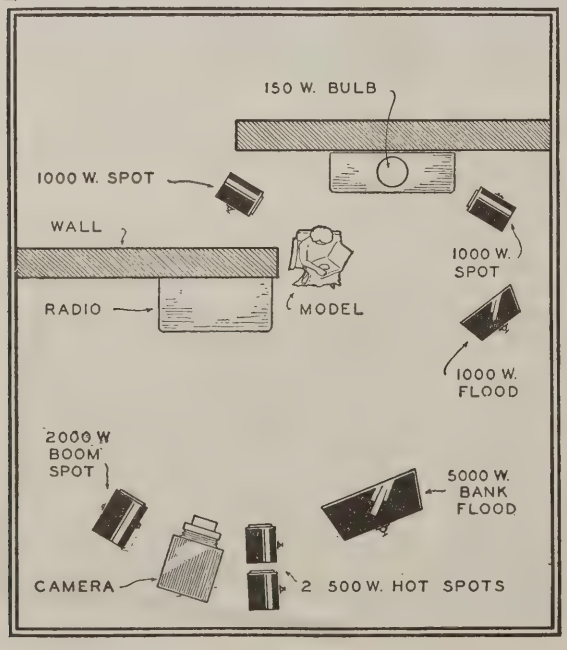
Photo hints may be illustrated with photographs, crude drawings, or need not be illustrated at all. However, the person submitting the hint must have tried it.

This month's Prize Winners are: S. K. Metcalfe, Harry Ross, Elmer McElreath and Jack Honrine.

How to Photograph

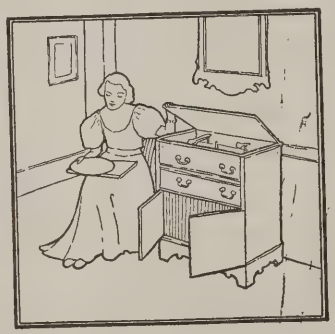




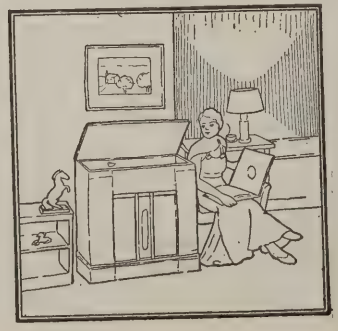


Drawings in column at left show lighting set-up used to produce pictures of RCA sets. Sketches below show how the set-up appears from the viewpoint of the camera.

When this set-up was used, the film employed was Defender XF, and the Goerz lens was stopped down to F:32 for the 1-second exposure.



This lighting, using the same lens and film, required an exposure of only 1/2 second with stop at F:22, which admits about twice as much light as the smaller stop.



● PRACTICALLY anyone who takes pride in his radio equipment wishes, at some time or other, to make a photograph of it. This picture may be wanted as a matter of record, to show to other fans, to enter in a contest, or even to send to some distant friend.

Of course, when making such a picture, one wishes the equipment to appear to best advantage. This end is achieved only by careful arrangement of the set, together with its background and any other objects to be included in the picture. One should also consider the factor of human interest —even the finest apparatus photographed by itself appears rather lifeless. If you are sufficiently fortunate as to have an attractive wife, sister, or feminine friend, by all means impress her into acting as a model. Her presence beside the cold equipment will add much warmth to the picture. The matters of costume and makeup need not cause you much worry. Any dress which is in the current mode, fits her well, has graceful lines, and is of a color which forms a pleasant but not marked contrast with the equipment will suffice. As to makeup, standard photographic makeup should be employed whenever available, but as this is not in the usual amateur photographer's accessory kit, you can get good results simply by having her use a suntan or rachel powder over a cold cream base, carefully wiping this off the eyebrows and lashes. Too dark a lipstick is to be avoided, as it is apt to make the lips photograph unnaturally dark even when panchromatic film is used. This is particularly true when your illumination is daylight. We, however, do most of our work under artificial light as this gives us a better control of conditions of illumination.

A commercial photographic studio, such as Joyce-Dravneek, naturally has far more elaborate lighting facilities than has the average amateur, whose lesser illumination can be compensated for, to a large extent, by maintaining "light balance"—that is by reducing the intensity of all lighting units *proportionately*. In other words, if you wish to follow one of the setups illustrated on these pages, and the maximum amount of light you can provide at the point where we have used 5,000 watts is 500 watts, then you had best reduce a light indicated as 1,000 watts to 100 watts, etc. Exposures will, of course, have to be increased to compensate for the diminished illumination.

Even that, however, will probably not enable you to achieve all the snap and detail that studio pictures carry. One of our biggest problems in all cases is to get sufficient light on the radios to bring out the full lustre and grain of the cabinets; then to balance the light on the rest of the set so that when the negative is correctly exposed, the background, model and "props" will not be lost in the shadows.

Placing the model is another problem which requires considerable study. Although the girl you use can lend much charm and interest to the picture, she must not be allowed to dominate it. While she must be definitely associated with your set,

Your Radio Set

Henry Dravneek,

master photographer, whose startling photographs of RCA radio equipment reach millions of readers every month, tells you how to take pictures of your favorite equipment. ***(Entrants in the R & T Monthly Photo Contest can get good pointers here.)***

she must be so posed that she does not obscure any portion of the radio apparatus—and often in such a way that she may be clipped from the picture without her removal detracting too much from its appearance.

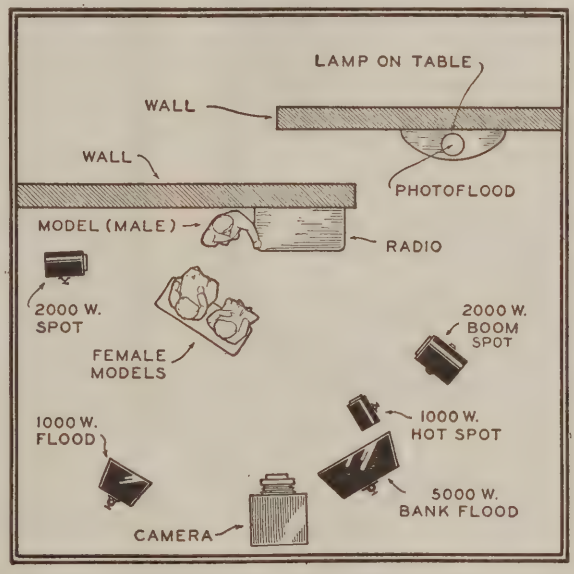
The background for your set should be so arranged that it will convey the atmosphere of a spacious, well-planned home. This can be done by having little furniture appear in the picture with the receiver, and by using furniture of a type which is congruent with the design of the apparatus. For example, if the receiver is in a Chippendale cabinet, a single chair of the same period will appear harmonious if placed next to it; similarly, if the set is housed in a modern cabinet, a single modern statuette or table as an adjunct will give a far better effect than would the most gorgeously appointed Louis XIV living room.

For each setup, some experimentation is always necessary when best results are desired—and they always should be. In our work we wish to bring out the grain of the rare woods used in the handsome cabinets of the RCA receivers.

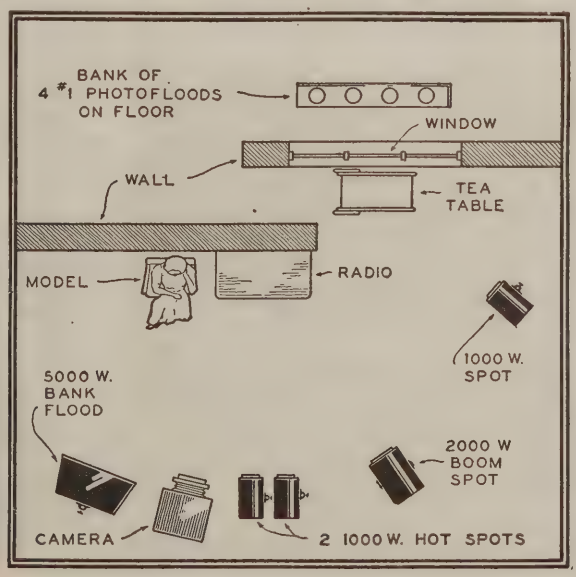
To do this we use "hot" spots, and wherever these are employed they are placed one directly above the other to eliminate double shadows as much as possible. Shadows are always a problem in this type of work and the only way to eliminate them is to use plenty of light sources. The lighting should be set up to bring out the wanted details, and then additional lights added to kill the shadows. Some times these shadows may be eliminated merely by a slight adjustment of the main lights without upsetting the illumination.

I know that this will not make me popular with the average minicam user, but I wish to stress that angle shots are to be avoided when a true picture of apparatus is required. While such shots may be—and often are—highly dramatic, they will distort the naturally lovely lines of well

(Continued on page 635)



The set-up shown above was used to make the photograph illustrating the article, "Photographing Television Images," which appeared in last month's "Foto-Craft" section. A 36 cm. Dagor lens was used at F:32 with a 1-second exposure on Defender XF pan film.



The same lens and film as mentioned above, and the same stop and exposure as used in the setup described at the lower left, were employed in this arrangement.

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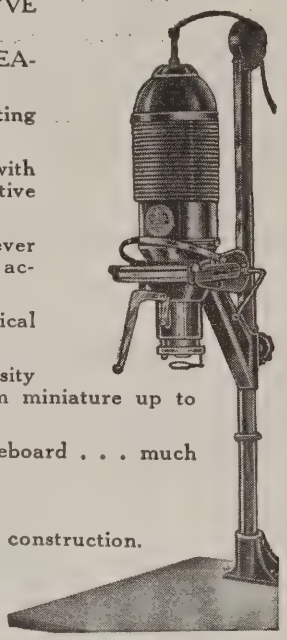

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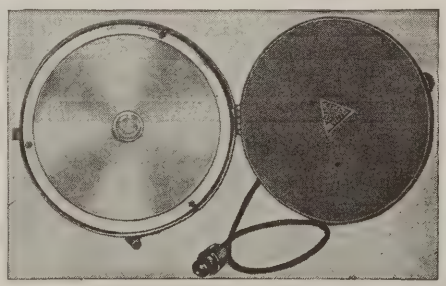

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Better Prints

(Continued from page 628)

Each of the first three trays should have its own pair of *tongs* and its own *print paddle.* Scratch marks may be made on these to indicate the solutions in which they are used, or you may prefer simply to store them with the trays in such a way that they will not be mixed up with one another. The same principles that make it important to mark your trays apply to reserving tongs and paddles for a single chemical solution.

Each print paddle is used in its own tray. Each pair of tongs is used to transfer the print from its own tray to the next one. They should never be dipped into any solution but the one for which they have been marked. If this should happen by accident, rinse the paddle or pair of tongs in the short-stop bath, and then wash thoroughly in hot running water, finishing with cold.

When the darkroom is prepared for use, the paddles may be rested across the trays, or left lying partly in them. The most convenient place to keep tongs is across the farther right-hand corner of the tray.

Now for the actual procedure. After the print has been exposed, take it in your left hand by one of the short edges. With your right hand, hold the print paddle in the developer tray so that it will be at one side and out of the way. With the same hand, tilt the tray away from you. The front need only be raised about one or one and a half inches—not high enough to cause the tongs to fall off. Slip the print in the solution narrow end first, *face up,* and push it toward the far end of the tray. As soon as the print is entirely in the tray, set the front edge down again, *hard.* This will cause the solution to slosh against the front of the tray, and, if the operation is performed properly, the entire surface of the print will be wet with developer.

The paper is face up so that it is possible to see any air bells or spots that are not completely covered. Once the print is in the solution, press it down gently with the print paddle to make certain that the entire surface is under the developer and thoroughly covered. If the solution is allowed to affect the paper unevenly at this stage, it will invariably leave visible marks which ruin the print.

Then pick up the paper with the tongs, raise it above the tray for an instant, and reinsert it *face down.* This avoids the ever-present possibility of light fog. Even a so-called safelight is not entirely safe if a print is exposed to it during the entire period of development.

Agitate the solution by pressing on the print gently with the paddle, or by moving the paddle back and forth in the tray. You may prefer simply to rock the tray occasionally. This method is just as effective.

Unless there is some local control to be used during the development process, or you are developing a test strip so that it is important to watch its progress, development should be allowed to proceed almost to completion before turning the print over again. If you do not like to time your prints, progress may be checked by pulling up one corner with the tongs for an occasional inspection.

When development has only a few more seconds to go, turn the print face up with the tongs. The final stages of development should be watched very critically with the eye. It is the last few seconds which are the most important. Do not make the mistake of yanking a print from the developer because you think it is getting too black. If it is really in that condition, you had better discard it and try another with less exposure. Let the delicate graduations build

up, and don't be deceived by the fact that a print looks somewhat darker under a safelight than it will when the white light is turned on.

When development is complete, remove the print from the first tray with the tongs. Let it drip from one corner for an instant, and then *drop* it into the short stop, without getting the alkaline tongs into the acid bath. While the tongs are being returned to the developer tray, you should already be agitating the print and submerging it in the short stop with the paddle in that tray. A few seconds are sufficient to stop the progress of the developer completely and neutralize it. Then pick up the print with the short-stop tongs and *drop* it into the hypo. Again be careful not to get the tongs into the next tray. Submerge the print immediately with the hypo paddle, and agitate it occasionally during fixation.

Of course, while the first print is being fixed, you will be working on a fresh enlargement. When that gets to the hypo tray, insert it on top of the previous one. Then, after it has been in the solution for a short time, slip the hypo paddle underneath both prints. Pick up the top one with the hypo tongs and slide it to the bottom of the pile. Continue this as you go along, and the prints will then be available for washing in proper sequence as fixation is completed.

Finally, the hypo tongs are used to transfer the print to the last tray. It should be washed in running water for at least one hour in order to remove the impregnated hypo.

Now, if you have followed these instructions carefully, you will notice at least one unusual circumstance immediately. Your hands haven't been wet at all! This is an item of convenience which is not to be sneezed at. But, more important than that, *it is wet hands which are the worst offenders in contaminating solutions and making chemical stains on prints.* Constant washing and drying of the hands takes time, and some chemical deposit will probably remain no matter how careful you are.

Photograph Your Radio

(Continued from page 633)

engineered radio equipment. Such distortion cannot be corrected on the enlarging easel or in any other way.

The photography of radio equipment is a field in which the older cameras, provided they have good, highly corrected lenses, can often outshine more modern equipment. This is only another way of saying that a large negative is extremely desirable. It is almost certain to excel that made with a miniature camera unless the latter is one of the finest (and correspondingly, most expensive) makes. Of course, the ideal equipment would include a studio camera, but a portable provided with ground glass back, or even a reflex is almost equally good. Cameras of these types are well suited to the work because they give the photographer an opportunity to study the composition of the scene exactly as it will appear on the negative. However, any sort of camera may be used if one is able to compose in the finder.

The real secret of successful photography of radio and other equipment is to take plenty of time and thought before snapping the shutter. A half-hour—an hour—or even a day—spent in getting the setup exactly right will provide perfect negatives. A hurry-up job may enable one to take acceptable pictures, but they will not be as good as though more care had been used. And we are all striving for perfection, aren't we?

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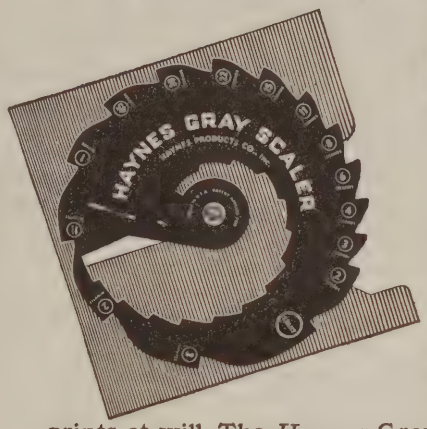

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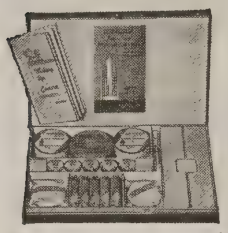

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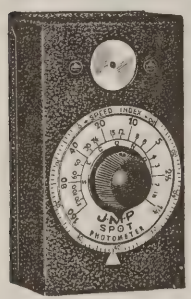

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Portraiture—As a Fine Art

(Continued from page 627)

tion of this make-up, amply proves this contention. It lends smoothness and color to her face, and gives it a sunburned effect. There's nothing like vanity, you know, to lend poise and confidence to an otherwise uncertain woman. Without those two qualities it is quite impossible to get a natural and striking portrait.

I use, for my camera portraits, a big Voigtländer, with the lens stopped down anywhere between f:12 and f:16—which gives a distinct photograph with the ears as much in focus as the nose. I've experimented in the past with several kinds of negatives, but recently have come to the conclusion that Triple X panchromatic negatives are the best. They give me clearer values than any I've ever tried, and all the linear qualities, shadowing and contrasts are brought out for reproduction (you must remember that I work essentially for reproduction) by the use of these negatives.

All things considered, I repeat, what counts the most in making good camera portraits is *simplicity*. Simplicity, that is, of technical paraphernalia. It's comparable to music making or architecture. Clutter up your work with a lot of non-essential materials and you'll get a hodge podge, with little clarity or unity; but stick to the few essential tools, and the result will more likely be a clear-cut, unified piece of work.

But that concerns only the tools. As I've already intimated, the human approach isn't so easy. Dealing with people never is as easy as dealing with inanimate objects, for temperament is apt to rear its ugly head at the most vital times. In Radio, fortunately, we seldom encounter this vice—radio people know the value of time, for they are used to having their rehearsals and performances timed to the split second. When they come up to our NBC studio to be "shot," they have allotted themselves just so many minutes for the operation, and will waste no time in sullenness, contrariness or tantrums. They are more anxious than myself, after all, to have successful portraits taken, as a large part of their success depends on their publicity. This, together with their time values, tends to make them unusually helpful camera subjects. Toscanini, conductor of the famed NBC Symphony Orchestra, is notorious for his temperament—if it can be called that. He just is allergic to bright lights, and his nervous energy makes it hard for him to keep still. A subject like him must therefore be handled to suit his allergies; so, in portraying him via the camera, I worked at top speed, used a minimum of lights, and pumped at him a steady stream of leading questions on music to put his mind in its own world and at ease.

Authors (in my case, NBC's script writers) are about the worst people to picture. They face the lens as they would a firing squad—face drawn, eyes and mouth nervously twitching. Not long ago I came across a writer with whose work I was familiar. I asked him about one of his characters; his face lit up and all the tension disappeared, and I worked on smoothly and unhurriedly, getting a set of superb pictures. This is just to emphasize again the human requirements in portrait photography. *Put your subject at ease* and nine-tenths of the fight is won.

A lot of people ask me at one time or another: "Just what makes a subject photogenic?" And my answer has always been the same: "Heaven knows!" If someone could only discover the secret of photogeny, it would be a boon for all portrait photographers. As it is, you can take two equally beautiful women—and one will con-

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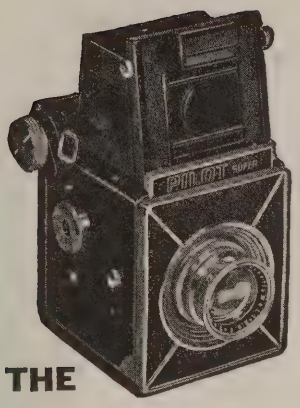

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sistently make good portraits, the other just as consistently bad ones. A lot of things, like color, hair, the shape of the eyes, go into making a person photogenic; but the proportion of these ingredients making or lessening a subject's photogenic qualities is still a dark mystery to me. My guess would be that the effect on the film of color, the complexion, and the texture of the skin, is what counts most. Charm and personality of course help a lot, and so does a pleasant smile—but then again, a person with those qualities might photograph terribly.

I will say that of the thousands of radio people I've photographed, Irene Rich, NBC's fine dramatic actress, is about the most consistently photogenic; she simply cannot fail to take a good picture. Some day, perhaps, I'll make a deep study of her case to arrive at the secret of photogeny. For the present I'll stick to the two tenets already explained: Simplicity and the Human Approach.

Microphotography

(Continued from page 629)

A word about the manipulation of this camera will be advisable. Select the object to be photographed with the microscope in the usual way. Place microscope under the camera. A light-tight cloth cylinder connects camera and microscope. Throw a beam of light by means of the sub-stage mirror up the microscope and onto a ground-glass in the film plane. Use focusing cloth to exclude light and focus sharply on the ground-glass. Interrupt the beam of light to the microscope with a small card. Place plate holder in position and open slide. Now remove the small card to illuminate the object and expose the film. Replace card, then return the slide and develop the film. When this camera is first used it is well to use small test strips of film in order to get the correct exposure. This will not be necessary after a number of pictures have been taken.

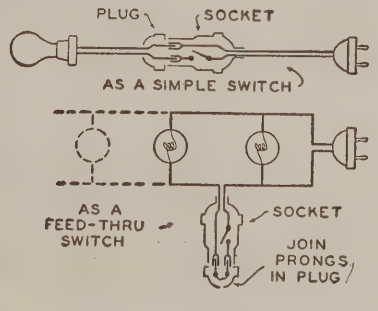
A Handy Foot Switch

(Continued from page 626)

knotted at each end to prevent strain on the socket.

Secure the shortened pull-chain to a screw-eye in the end of the treadle at a point which will allow the action of the switch but which will permit a little slack in the chain when the treadle is depressed to the stop. Likewise, adjust the spring so that the treadle is not hanging from the chain when it is released. This precaution will protect the mechanism of the switch when the treadle is tramped upon.

The switch may be made to control either one or both sides of a circuit, as shown in the circuit diagram; that is, as a simple or a feed-through switch. This may be done by inserting into the screw plug a prong plug, the contact posts of which have been connected by a short piece of wire, thus converting the feed-through switch into a one-way type.



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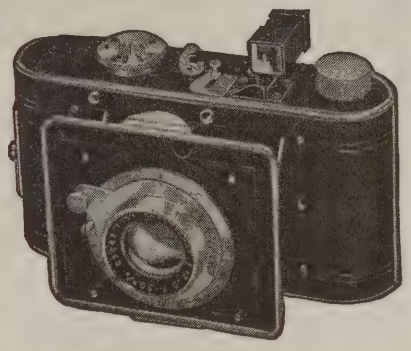

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H. Gernsback

Editor

NO. 1122

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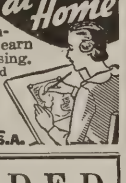

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Save Time

(Continued from page 628)

center it over mask, so that it will have the same amount of safe edge all around. Cut one piece of very thin cardboard the width of your glass. This is cut in half and the two pieces (A-A in the sketch) are glued on the glass and negative mask, fitting up to the film on both sides. These form a guide or runway for the film. Now cut two more pieces of very thin cardboard (B-B) and glue on over the first two, but let them lap over the edge of the film about 3/32 of an inch. This forms a track for the film and holds it in place. Two small strips (C-C) are now cut to form the paper bracket.

Now determine the size of border you want. Cut a piece of transparent paper to the size of your printing paper. The size of your paper determines how much or how little border you can have. Place the transparent paper over the negative mask, and adjust it until you have an even border all around. This serves as a guide for gluing on the two strips to form the paper bracket. One is glued on the bottom side, and one at the left side. The strip at the left should be glued on the ends only, as the film runs under it.

We are now ready for the hinged cover. Take a piece of strong, heavy cardboard, cut to the size of your glass. Cut this piece in two parts so that when placed on the glass the cut comes at the middle of the negative mask. Place the two pieces together as one and hinge with Scotch tape. Next place this on the glass and hinge the top to it.

The strip printer may be used on any printing box. The palm of the hand or a small book is used for pressure on the cover. If the negative requires some dodging, the printer may be used on a table or bench, with a pair of weights placed on the edges for pressure. Dodging may be done in the same manner as for projection. If you do not have a printing box, use a floor lamp and card table. An amber bulb can be used in one socket of the floor lamp for visual light.

To make the printer still more efficient, secure a printing frame the proper size for the glass. Take it to a cabinet shop and have slots sawed out on each side to permit the film to run through the frame. The slots should be sandpapered to prevent scratching the film. Finally, secure a small pair of hinges, and hinge the platen to the top of the frame. The cardboard cover is not necessary if printer is used in a frame.

The New Master Leicameter

• INSTEAD of the direct scale giving readings in candles per square foot, Weston's new Master Leicameter readings are in direct shutter speeds. The "High Illumination" scale gives direct readings from ½ second to 1/1000 second, based on a film speed of Weston 24 and a diaphragm opening of f:6.3. In the "Low Illumination" scale, the film speed of Weston 50 has been chosen, since films of this speed are generally employed for indoor photography, and the scales are based on the use of a diaphragm opening of f:2. A calculator dial indicates the diaphragm stop to use when film speeds other than those on which the scales are based are used. The calculator dial can also be employed to determine the shutter speeds to be used at various diaphragm openings, for any particular reading.

New Speedex Camera with F4.5 Lens

• AGFA Ansco's latest contribution in the field of fine hand cameras, the Speedex, is fitted with an f:4.5 Anastigmat lens of 85 mm. focal length and a precision shutter with speeds of ½ to 1/250 second, as well as time and bulb exposures. Measuring only 5¾ x 3⅝ x 1½ inches in size (closed), the Speedex takes twelve 2¼ x 2¼-inch pictures per roll of B2 (or 120) size film. Focusing from 3½ feet to infinity is provided. The shutter, which is of the pre-set type, is released by a button on the body of the camera.

Money from Your Camera

(Continued from page 626)

lessons from my interviews with the syndicates. I found there was a rigid set of requirements which all pictures must satisfy. I also learned that a picture *did not have to be technically perfect* to find a market. I was told a picture could be either photographically perfect, or of such an unusual subject matter that, irrespective of perfection, it was acceptable and saleable. My equipment necessarily confined me to the latter.

Through conversations and interviews with photographers, I soon learned that to sell a picture to a specific magazine brought but one profit, for the contents of that magazine were released under a publishers copyright. On the other hand, selling a picture to a syndicate, if it is a legitimate company, brought a nice royalty each time the picture was sold *and it could be sold over and over.* (Syndicates pay 35% royalty on negatives.)

An agreement was made with Underwood & Underwood, probably America's most widely known syndicate. They outlined the types of pictures in demand, as follows:

1. Real conditions in Russia and the Far East.
2. Pictures of all government officials.
3. War activity: soldiers, planes, ships etc.
4. Modes of transportation.
5. Street cafe scenes and modern buildings.
6. Varied industrial shots all countries.
7. Pictures, winter, fall, spring, summer.
8. Sports, nation wide.
9. City traffic and highway scenes.
10. Subway scenes and construction pictures.
11. New homes and farm scenes.
12. Shop and store fronts with people in season attire.
13. Automobiles, new models, especially with notables.
14. All scenes of unusual interest.

Here is a list of the leading syndicates with whom one need have no fear of placing negatives. As the sales are made, checks are mailed to the original negative's owner.

1. Underwood & Underwood, 420 Lexington Ave., New York..
2. King Features Synd., 235 East 45th St., N.Y.C.
3. New York Herald Tribune, New York City.
4. North American Newspaper Alliance, Philadelphia.
5. Wide World Photos, New York City.

Many salable pictures were made with a 35 mm. Agfa Memo camera. It will be found that every picture has an angle beyond the correct angle of photography; that is the market angle. Knowing the market is just as important as knowing your camera. Almost any picture taken can be sold if and when you find the angle.

The Japanese picture shown was taken at F 6.3 and given 32 seconds. It was a picture at random in the writers' room of a Japanese hotel in the city of Moji. The only light available was that which filtered in through the single window-wall. That picture had an angle related to a trade journal and was sold to a magazine covering activity in the hotel profession here in America. The editor thought his reading public, mostly hotel staff, would be interested in seeing the inside of a Japanese hotel room. This picture brought $10.00 (which, it is to be remembered, was transformed into Japanese money and spent in Japan. This multiplied the sum to 33 Japanese dollars, each equal in buying power to our dollar here.)

The Japanese temple picture reproduced with this article was made with a Kodak Rec. at F 4.5 and at 1/50th sec. The writer has never attempted to sell it for it makes up a complete series of temple pictures from Asia.

An inside temple scene with a beautifully hand carved chest and writer included, was an admirable example of both good and bad photography. Naturally one should never attempt to stand for a time exposure, especially one such as this for the shot was made at F 6.3 and required 35 seconds exposure, the only light being a high temple window and eight candles, all burning.

The skull of the man is a sample of what happens to soldiers in China. During the fly season, if the bodies are not recovered within two or three days, the insects and rodents devour all the flesh, leaving only bones and cloth for recognition and burial. This picture was made with a Leica-G at F 3.5 and 1/100th sec.

Contrary to popular thought, trade journals are an excellent market for the would-be news photographer and often pay double the fee of a larger magazine.

Minicams for Airplane Pix

(Continued from page 625)

Because of the small size of the negative it is much more easily affected by vibration and movement. Because of the large *blow-ups* necessary in the final print it also must have a lens far more accurately calculated than the large camera lens.

The large camera is subject to the same vibration and movement as is the miniature but because of the larger negative size, running to 6½ by 8½ to 8 by 10 in specially designed aerial cameras, these defects those cause in the negative do not show up in the print. Thus the miniature user must produce a negative that is technically more perfect than the one turned out by the large camera *but he has in his hands an instrument that is capable of doing this.*

Aerial photography is relatively easy once the photographer understands the basic principles behind it. To enter a plane and snap countless pictures with but little thought or care is to invite failure. To use just a little common sense and to take the pictures with a little care means good pictures.

The camera, lens and shutter speed choice are not important. Cameras such as the Leica, Contax and Robot are among the best suited for the work, but almost any camera will do. The lens should be at least an F:4.5. The shutter should run to 1/100 at the minimum and speeds of from 1/300 to 1/1000 are to be preferred. Cameras with metal bellows are superior to those with leather bellows, but by turning the bed into the wind, a camera with a leather bellows can be made to perform efficiently.

Choice of a film is vastly more important. Almost every aerial photograph is cluttered up with thousands of small objects, such as trees, fields or houses. To record this minute detail in such a manner that it can stand extreme enlargement, it is preferable to use slow, fine-grained film such as Agfa Finopan, DuPont Parpan or Eastman Panatomic-X.

The reader should not confuse ability to enlarge with ability to record.

(To be concluded next month)

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By the use of the Pantagraph included in the outfit, any design may be reproduced either in original, reduced or enlarged form.

Outfit consists of: one Pyro-electric Pencil; one Pantagraph; three hardwood plaques; one bottle of Varnish; one Brush; one tracing tip and four-page instruction sheet.

Size of box: 12½ x 8½ inches.

Outfit will be forwarded by Express Collect if not sufficient postage included with your order.

WELLWORTH TRADING CO.

1915 S. State St., Dept, RT-240 Chicago, Ill.

Exposure Meter

(Continued from page 631)

objection because of sensitized paper in the dark room. If so, a ruby window may be placed in the shade which will render the light safe and will not impair the function of the device.

I have found this to be extremely valuable and quick to use. One of the advantages of it is that you can expose for any sky clouds or shadows by just watching *the part of the projected negatives that you are most interested in* until it fades out.—*S. K. Metcalfe, South Slocum, B. C., Canada.*

Filter Mounting

(Continued from page 631)

drop of balsam is placed upon the center of this circle, and the filter material laid on top; another drop of balsam goes on its center and the final glass cover put in place. Press the cover down gently with the toothpick and place the weight on top. Thus a "sandwich" of filter material between glass with balsam as binder is the result. Place this away in a warm place for two or three weeks to harden. Pay no attention to air bubbles as these will disappear. When the balsam has hardened on the edges, clean off all excess with xylol or benzine after carefully removing the cemented filter from the stack. A top kitchenshelf or hot water radiator will hasten the day when the filter can be used.

"Hot" Method. This method is more tricky and requires more skill than the cold method but, if properly done, without carbonizing (blackening) the balsam, the filter can be used immediately upon cooling. The main idea here is to drive off most of the volatile oils in the balsam so that, when cold, it will no longer be tackey and soft. Hardening must not be carried too far, for then the cement will crystallize, a useless condition for optical purposes. If, however, this does happen, more liquid balsam or xylol solvent can be added. Again, if the cement is heated until it gets black, it is entirely worthless and the filter must be started over again. A low, gentle heat of about 120° F. for a period of time is ideal.

Clean and flame the glass covers as before under the cold method. Also prepare the filter material. Place the glass circles on a hot plate or upturned electric iron, kept at the proper low temperature. Put a large drop of Canada balsam in the center of each warm cover. You will note that the heat spreads the cement and you will smell the vapors of the oils coming off. After five minutes, a test for hardness can be made by taking the covers of the hot plate with the tweezers and letting them cool off. If the cement is still tackey and soft, it must be reheated. Repeat this until the balsam is not brittle when cold but firm and jelly-like. The toothpick will leave a dent in the cement without picking up any balsam when the hardness is just right.

When the last test is made, replace both covers on the hot plate until the balsam is again soft. Now, working quickly, pick up one of the covers with the cement side upmost and place between it the nails of the stacking jig. Place the clean Polaroid or filter circle upon this, and the second cover, balsam down on top. Press together firmly with rubber end of pencil, adding pressure where needed to press out all air bubbles.

The filter, when cold, can be cleaned of excess cement with xylol or benzine, followed with soap and water. It may then be mounted in a holder.—*Harry Ross, New York City, N. Y.*

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"Any hour of the day or night she is willing to do my bidding, unfaltering and without question. She fits my every mood. She causes no remorse, no heartache. And I am never lonely, because she is always where I can find her.

"She is lovely as she sits there so quietly in her black glossy gown. You see, I explained, she is my National HRO Sr."

JOHN K. YOUNG *(W8JHS)*

We receive many testimonials, which repose safely in our files, but the lyric quality of Mr. Young's comments make his letter so unique that we thought we would publish it just as it came to us. The picture was our own idea. National Company, Inc., Malden, Mass.

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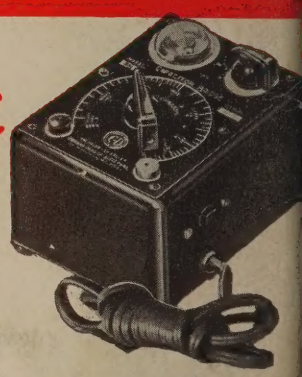

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